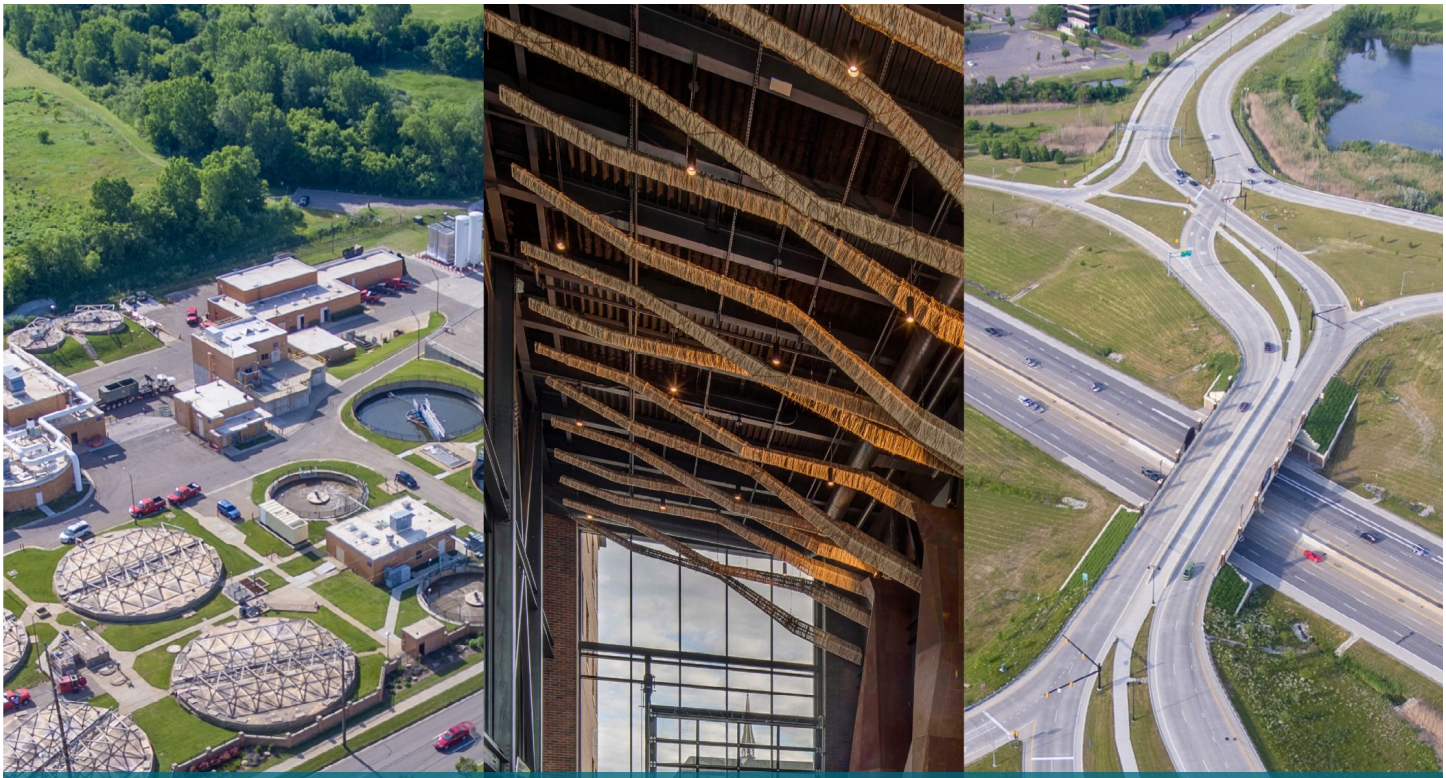

City of Grand Rapids, Michigan Drinking Water Revolving Fund Project Plan

Project No. 190666
March 13, 2020

fishbeck
Engineers | Architects | Scientists | Constructors

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List of Abbreviations/Acronyms

ADD	Average Day Demand
AQI	air quality index
AWWA	American Water Works Association
City	City of Grand Rapids
CBSA	core based on statistical areas
CMP	Comprehensive Master Plan
DWRF	Drinking Water Revolving Fund
EHPD	east high pressure district
EGLE	Michigan Department of Environment, Great Lakes, and Energy
EQ	equalization
FEMA	Federal Emergency Management Agency
floc/sed	flocculation/sedimentation
ft	feet
gpm	gallons per minute
HP	high pressure
hsc	horizontal split case
HVAC	heating, ventilation, and air conditioning
LMFP	Lake Michigan Filtration Plant
LLPS	low lift pumping stations
LP	low pressure
LUST	Leaking Underground Storage Tank
MAHI	Median Annual Household Income
MDD	Maximum Day Demand
MG	million gallons
mgd	million gallons per day
mg/L	milligrams per liter
MNFO	Michigan Natural Features Inventory
MP	medium pressure
PERT	program evaluation and review technique
psi	pounds per square inch
PRV	pressure reducing valve
REGIS	Grand Valley Metro Council Regional GIS
RPM	revolutions per minute
SETM	Southeast Transmission Main
SHPO	State Historical Preservation Office
THPO	Tribal Historic Preservation Officer
USD	utility service district
VFD	variable frequency drive
vsp	vertical split case
WMRPC	West Michigan Regional Planning Commission

1.0 Introduction

In May 2019, the City of Grand Rapids (City) retained Fishbeck to complete a Drinking Water Revolving Fund (DWRF) Project Plan for improvements to the City's water system. The improvements include work at the Lake Michigan Filtration Plant (LMFP) and work within the water distribution system serving Grand Rapids and the surrounding communities. The purpose of this document is to present the Project Plan and meet the project planning requirements of the Michigan Department of Environment, Great Lakes, and Energy (EGLE).

There are several water system needs that will be addressed by the proposed DWRF projects including:

- Modifications at the LMFP to improve residuals handling facilities.
- Modifications to provide energy savings and improve reliability, including new variable frequency drives (VFDs), and motor and pump replacement at the Franklin Pump Station.
- Improved reliability of facility operations by upgrading the backup power supply to the Franklin Pump Station.
- Addition of water main and valves to provide looping for water quality, supply, and reliability.
- Replacement of aged water main to maintain service and water quality.
- Replacement of lead service lines to comply with the Safe Drinking Water Act.

The water system includes the intakes extending into Lake Michigan, the low lift pumps, the LMFP, the high service pumps, the transmission mains, and the distribution system including reservoirs, elevated storage, and pumping facilities.

The LMFP is a 135 million gallon per day (mgd) water filtration treatment facility owned and operated by the City of Grand Rapids, using Lake Michigan as its water source. The LMFP is in Grand Haven Township in Ottawa County. The treated water is pumped 25 miles to the City of Grand Rapids distribution system. Along the 25-mile transmission main are wholesale customers including Allendale Township, Coopersville, and Ottawa County. When the water reaches the City, it is distributed to various ground-level reservoirs from which the water is pumped throughout the distribution system. Figure 1 shows the location of the LMFP relative to the water distribution system.

The current water distribution system is shown in Figure 2 including reservoirs, elevated storage, water mains, booster pumps, and pressure districts. The reservoirs within the City of Grand Rapids are ground level and below ground units with pumping stations. Six elevated storage tanks and six booster pump stations help maintain and regulate pressure within the system (Coldbrook pumps are included with the booster pumps since they can pump directly from the Low Pressure District into the Intermediate).

The purple lines in Figure 2 represent the primary transmission water mains (24-inch through 60-inch diameter) that connect the various reservoirs and elevated tanks. The blue lines represent the large diameter water mains (10-inch through 20-inch). Smaller diameter water mains (4-inch through 8-inch) are not included in the figure for simplicity.

The distribution system is divided into multiple pressure districts. The pressure districts are illustrated in Figure 2 and Figure 3. Labeling pressure districts as high or low refers to the hydraulic grade line. The High Pressure Districts have a higher elevation and are operated at a higher hydraulic grade line. The Low Pressure Districts are at lower elevations and operate at a lower hydraulic grade line. The Intermediate and Regulated Pressure Districts are at intermediate elevations. In general, the City tries to provide pressures between 40 and 80 pounds per square inch (psi) across the system. The various pressure districts are connected by pressure-reducing valves (PRVs) and emergency interconnects.

The City of Grand Rapids has contractual agreements to supply water within the Utility Service District (USD), also known as the Water Contract Area, shown in Figure 1. The USD includes both wholesale customers and retail customers. Wholesale customers maintain their own water distribution system and purchase water from Grand Rapids through metered connections, whereas the distribution system for retail customers is incorporated within the Grand Rapids system; its customers are billed by the City. The Study Area for the DWRF Project Plan includes the City of Grand Rapids and its retail customers.

- Wholesale Customers
  - Allendale Township
  - Coopersville
  - Ottawa County
  - East Grand Rapids
  - Ada Township

- Retail Customers
  - City of Grand Rapids
  - City of Kentwood
  - City of Walker
  - Tallmadge Township
  - Cascade Township
  - Grand Rapids Township

The Grand Rapids water distribution system is currently being reviewed in Segment III of the *2020 City of Grand Rapids Comprehensive Master Plan (CMP)*, which will be completed in the fall of 2020. Average day demand (ADD) for the Grand Rapids system is projected to increase by 20% from 38.8 mgd to 46.6 mgd over the 20-year period of 2020 to 2040. Over the same time period, maximum day demand (MDD) is projected to increase by 19% from 83.0 mgd to 99.0 mgd. The population and water demand projections are summarized in Section 2.3 and 2.4.

The previous CMP from 2015 identified recommended improvements to the water system. Additional reports were prepared to evaluate the condition and capacity of various unit processes and transmission main capacity. The recommended projects included in the DWRF Project Plan are as follows.

Projects at the LMFP

1. LMFP Residuals Handling Improvements.

Projects within the Distribution System

2. Franklin Street Pump Station Pump Replacement.
3. College Avenue Water Main.
4. Straight Avenue SW and Wealthy Street SW Water Main.
5. Page, Carrier, Lister, and Plainfield Improvements.
6. Private Lead Service Line Replacement.
7. Giddings Avenue Water Main.
8. Eleanor Street Water Main.
9. Plainfield Avenue Water Main.
10. Garfield Avenue Water Main.

The LMFP project focuses on environmental impact, reliability, and compliance at the water treatment plant. The projects within the water distribution system focus on increasing energy efficiency, addressing low residual chlorine, and water quality concerns experienced in dead-end mains, aging infrastructure, and lead service lines.

2.0 Project Background

2.1 Delineation of Study Area

The City of Grand Rapids, located in the central-western portion of the state, is a regional waterworks system supplying a large portion of the surrounding community. The Study Area includes the City of Grand Rapids and its retail customers as shown in Figure 1. The retail customers include the City of Kentwood, City of Walker, Tallmadge Township, Cascade Township, and Grand Rapids Township. The current water distribution system and a map of the major surface waters are depicted in Figure 2 and Map 2 respectively.

A project is also proposed at the LMFP in Grand Haven Township located on the shore of Lake Michigan, in the central portion of the state. The proposed project is within existing water treatment facilities and includes site work within the LMFP property boundaries.

2.2 Land Use

The existing land use in the Study Area includes residential, commercial, industrial, recreational, and undeveloped, as indicated on Map 8. Existing land use is represented using the current zoning map layers published by the City on Esri ArcOnline map services. Map 9 presents the planned land use for each municipality as provided by Grand Valley Metro Council Regional GIS (REGIS). Planned land use was obtained from individual community comprehensive master plans and compiled by REGIS for communities in Kent County.

Map 7 visually represents the population density within the Study Area. As indicated by this map, East Grand Rapids and the City of Grand Rapids are fully developed. East Grand Rapids is predominantly residential with some commercial development. The City of Grand Rapids is mostly medium density residential with commercial development and public land interspersed. Most of the industrial development in the City is along the Grand River, near I-196 at the eastern City limit, and on the south side of the City.

Ada Township and Grand Rapids Township are mostly residential with interspersed commercial development. Significant portions of the Townships are forested. There is very little industrial land use in these townships, except for Amway/Alticor located in Ada Township along the Grand River.

Cascade Charter Township is industrial in the southwest corner near the airport (utility/transportation). There is a corridor of commercial development along 28th Street that extends from Cascade Township through Kentwood and Grand Rapids, into Wyoming and Grandville. East of the airport is mostly residential development with some agricultural land on the eastern limit.

The City of Kentwood within the USD is mixed-use. There is a significant portion of industrial land use south near the airport. Again, there is commercial development along 28th Street. There is a fair amount of water/wetland and parks/open space. Residential development in this part of the City of Kentwood is more dispersed. There is some agricultural land to the south of the airport.

The City of Walker is mixed-use with most of the residential development along the central portion of the City. Industrial development is concentrated near the I-96 corridor to the north with some development south along the Grand River and I-196. South Walker is mixed residential and forested with a large area of parks/open space in the southeast corner (Johnson Park).

Tallmadge Township is mostly agricultural and forested with intermixed residential development. There is sparse commercial development and one industrial area in the central portion of the Township along the eastern limit.

In the development of the 2020 CMP, each customer community was contacted and provided an opportunity to review and comment on the amount and distribution of projected growth within the Study Area. The regional economic model was customized to forecast long-term growth because of changes such as product and service technologies, transportation, energy, environmental and workforce policies, and investment initiatives. The areas projected to see reasonably significant growth in total population include Cascade Charter Township and Grand Rapids Charter Township. These outlying areas have experienced an increase in total population over the past decade and anticipate continued growth with additional development in the future.

2.3 Population Projections

Table 1 provides the projected populations for the Study Area and year-round service area.

Table 1 – Connected Population Projections

	Total Population 2018[1]	Connected Population[2] 2020	Connected Population[2] 2025	Connected Population[2] 2030	Connected Population[2] 2040
Jurisdictions in Study Area					
City of Grand Rapids	200,217	202,100	208,220	214,952	230,502
City of Kentwood	51,868	23,620	25,480	27,340	28,000
City of Walker	24,880	21,425	22,975	24,525	26,075
Tallmadge Township	8,339	1,380	1,580	1,780	2,180
Cascade Township	19,245	10,180	11,245	12,310	14,440
Grand Rapids Township	18,602	14,300	15,000	15,500	15,900
Total in Study Area	*323,151*	*273,005*	*284,500*	*296,407*	*306,752*
Additional Jurisdictions in Service Area					
City of Coopersville	4,377	4,300	4,305	4,310	4,320
City of East Grand Rapids	11,884	11,884	11,900	11,915	11,945
Ada Township	14,717	7,250	8,300	9,600	12,000
Allendale Township[3]	26,686	10,032	12,371	14,869	18,797
Ottawa County	--	1,344	1,572	1,829	2,343
Total in Service Area	*380,815*	*307,815*	*322,948*	*338,930*	*366,502*

[1] The U.S. Census Bureau's Population Estimates Program (PEP) for the year 2018.
[2] The current connected population was provided by the City of Grand Rapids and Ottawa County for each community. The projected connected populations are estimated and will be reported in the 2020 CMP update.
[3] The connected population for Allendale Township reflects the permanent population, and include the transient GVSU student population.

2.4 Water Demand

The entire water demand for the City of Grand Rapids and its customer communities is supplied by water from Lake Michigan that is treated at the LMFP. Population projections, in conjunction with historical water use data and land use planning information, were used to project future water demands. The wholesale customers connected to the distribution system are metered and billed at a single supply point and retail customers in the distribution system are metered individually.

In the 2020 CMP that is currently being prepared, average day and maximum day water demands are projected in 5-year increments from 2020 to 2040 for each customer community. The projected ADD for the entire system increases from approximately 38.79 mgd in 2020 to 46.59 mgd in 2040, an increase of approximately 20%. The average day and maximum day demand projections for each customer community for the years 2020 and 2040 are shown in Table 2. For the overall system, current billing data indicates that demand is allocated 55% residential and 45% commercial/industrial.

Table 2 – Grand Rapids Metropolitan Area Demand Projections

Customer Community	ADD		MDD	
	2020	2040	2020	2040
City of Grand Rapids	20.552	22.284	45.215	49.026
Kentwood	4.488	5.321	7.855	9.311
Walker	3.061	3.726	6.429	7.824
East Grand Rapids	1.265	1.272	2.948	2.963
Cascade Charter Township	2.389	3.389	4.540	6.439
Grand Rapids Township	1.718	1.910	4.122	4.583
Ada Township	1.393	2.306	3.552	5.879
Tallmadge Township	0.123	0.194	0.289	0.457
Allendale Township	2.010	3.680	4.020	7.360
Coopersville	1.560	2.110	3.330	4.000
Other Ottawa County	0.230	0.401	0.689	1.202
Total	38.789	46.593	82.989	99.044

Many of the proposed DWRF projects have been developed based on the results of the hydraulic modeling in the 2015 CMP. The recommendations were based on the projected 2035 demands. The projected ADD demand for 2040 is a 5% increase above the 2035 ADD demand presented in the 2015 CMP, and does not change the modeling or recommendations developed in the 2015 CMP.

2.5 Existing Facilities

2.5.1 LMFP

The Grand Rapids LMFP is located on Lake Michigan Drive near Lakeshore Avenue in Grand Haven Township, near the Lake Michigan shore as depicted in Figure 1 and Figure 5. The LMFP provides drinking water to the City of Grand Rapids and its customer communities. The LMFP has two intakes in Lake Michigan connecting to two Low Lift Pump Stations (LLPS) which supply raw water from Lake Michigan to the LMFP. At the LMFP, the raw water travels through rapid mix tanks for chemical addition, then to either flocculation/sedimentation (floc/sed) basins or inclined plate settlers for clarification. After clarification, the water travels through dual media (sand/anthracite) filters for further purification. After filtration, the water is stored in two treated water reservoirs prior to high lift pumping, which transfers the water to the distribution system transmission mains. Residuals from the sedimentation and filtration processes are sent to earthen lagoons onsite that are periodically drained, and the alum residue is disposed of.

The LMFP is a conventional surface water treatment plant rated at 135 mgd. The major facilities within this plant are listed in a summary of existing process facilities presented in Appendix 1. The summary includes design criteria, sizes, and capacities for each major component of the plant. Appendix 1 also includes a list of the installation/latest renovation date, the expected remaining service life, and the observed condition of each component.

The approximate capacities of the main plant components are shown in Table 3.

Table 3 – Capacities of Main LMFP Components

Component	Capacity
North Intake and Old Low Lift Pumps	60 mgd North Intake Capacity
South Intake and New Low Lift Pumps	95 mgd One Large Pump + One Small Pump
Total Raw Water Delivery to Plant	155 mgd
Rapid Mix/Floc/Sed	135 mgd
Dual Media Filtration	135 mgd All Filters Online at 3.9 gal/min/sq ft
High Service Pumping (without booster)	86.5 mgd Limited by Downstream Conditions
Chlorine, Alum, Fluoride, Phosphate Systems	135 mgd

As shown above, all the critical water supply and treatment components of the LMFP have adequate capacity for the current year (2020) maximum day water demand. Except for high service pumping, the critical water supply and treatment components of the LMFP also have adequate capacity for the projected year (2040) maximum day water demand. Reduced high service pumping capacity has been evaluated in *Technical Memorandum P-18: Transmission System Capacity Improvement Evaluation (May 2013)* and in *South High Lift Pump Improvements South Transmission Main Evaluations (July 2019)* prepared by Fishbeck. Items that have been studied include headloss in the transmission mains due to buildup of phosphate and reduced diameter cone valves, changes in the hydraulic grade at the City, surge valve settings, and the impacts on the M-45 Booster Pump Station. Various alternatives to increase the capacity of the high service pumping were presented in *Technical Memorandum P-18*.

Although the LMFP is located along the Lake Michigan shoreline, it has not historically experienced flooding due to extreme weather events. In the last year, however, City staff at the LMFP have expressed concern regarding erosion observed at the shoreline of the low lift pump station property. A preliminary design study is currently underway to evaluate the existing revetment and determine any necessary improvements. Apart from the low lift station along the shore, the LMFP is outside of the 100-year flood plain. EGLE issued a Sanitary Survey for the City of Grand Rapids Water System in 2017 that identified components at the LMFP that may experience flooding in the event of pipe or tank failure, which included the Old Low Lift Pumps, North High Lift Pumps, and the filter backwash pumps. In the event of a power outage, adequate standby power is available as a backup to maintain operations at the LMFP. The equipment is regularly exercised and maintained.

Even though treatment capacities are adequate, improvements to the residuals handling process at the LMFP are needed to increase reliability and improve operations as detailed in this Project Plan.

2.5.2 Water Distribution System

Segment II of the 2015 CMP provided a comprehensive review of the Grand Rapids Water Distribution System. An evaluation of the electrical reliability and redundancy of the water distribution system pump stations was also included in the document. The evaluation focused on the age of the equipment and on the availability of redundant supply including dual power supplies, onsite generators, and generator connections that are operated using a portable generator. Modifications to improve the system's response to events related to extreme weather or other climatic factors are being addressed by the City through efforts to obtain Federal Emergency Management Agency (FEMA) grants for several pump stations. An updated evaluation of the availability of backup power supply for continued facility operations will be included in the 2020 CMP update.

Appendix 1 presents a summary of the distribution system detailing the properties and conditions of various system components. Appendix 1 includes a detailed list of all pumps in the system; the reservoirs, storage tanks, and pumps have been well maintained. The appendix also includes a summary of pipe properties and age, the age and size of valves in the system, the age of hydrants and service lines, and details on storage facilities. The oldest sections of the water system are in downtown Grand Rapids; the City experiences water main breaks due to old pipes and valves. The City maintains an ongoing program to replace old infrastructure, replacing aging water main and valves in conjunction with street repaving and utility work. DWRF funding will be sought for water main replacement to address water quality, reliability, compliance, and aging infrastructure. The current water distribution system is shown in Figure 2, with a hydraulic profile provided in Figure 3. Below is a summary of the major system components and the general flow of water through the system.

Starting at the LMFP in Grand Haven Township, there are two 5 million gallon (MG) reservoirs. As a note, within the Grand Rapids system, reservoirs are ground-level or below grade tanks paired with pumping stations. Nine high service pumps deliver the finished water 25 miles through the North and South Transmission Mains, from the LMFP to the City. Along the North Transmission Main is the M-45 Booster Pump Station in Allendale. When the North Transmission Main delivered water to the Monroe Reservoir, the Booster Pump Station was operated to increase capacity. When the North Transmission Main was connected directly to the Low Pressure District, 100 feet (ft) of static head were added, so the M-45 Booster Pump Station has not been utilized since this time. The operation of the M-45 Booster Pump Station is being reviewed along with other improvements to increase the high service pump capacity.

At the City, the water is first supplied to the Wilson Reservoir (5 MG), the Covell Reservoir (16 MG), the Burton Reservoir (5 MG), the Monroe Reservoir (5 MG), the Livingston Reservoir (16 MG), and the Franklin Reservoir (16 MG). In addition, the North Transmission Main connects directly to the Low Pressure District.

Within the City's distribution system, each pressure district is operated at a different hydraulic grade line. Interconnects and PRVs between pressure districts provide a fully connected system. To isolate the districts, existing valves are closed in various portions of the system, which in some cases creates dead-end water mains. Dead-end lines are flushed approximately once every 30 days to maintain water quality.

A brief explanation is provided below for each pressure district.

2.5.2.1 West High and North Walker Pressure Districts

The West High Pressure District can be supplied by the Wilson or Covell Reservoirs. Ideally, supply is provided by Wilson, which is located on the west side of the distribution system, 6.5 miles before the transmission main first ties into the Low Pressure District at Richmond Street and Seward Ave. Due to the Wilson Reservoir location on the west side of the system, hydraulic losses are minimized as compared to the Covell Reservoir, which fills from the Low Pressure District. The Covell Reservoir is located in and pumps to the West High Pressure District; however, it is hydraulically connected to and filled from, the Low Pressure District. The hydraulic grade in the West High Pressure District is controlled by the 1.0 MG Leonard Street Storage Tank.

Supply to the North Walker Pressure District is through the Bristol Booster Pump Station, which is used to supply the district and to fill the North Walker Elevated Storage Tank.

2.5.2.2 Low Pressure District

The Low Pressure District runs along the river valley. Both the North and South Transmission Mains connect to the Low Pressure District. The Monroe Reservoir and the Coldbrook Pump Station are located within the Low Pressure District. In addition, the Covell, Livingston, and Franklin Reservoirs are connected to the Low Pressure District. Water is pumped out of the Low Pressure District into the Regulated, Intermediate, Tulip, Alger, West High, and East High Pressure Districts (EHPD).

2.5.2.3 Intermediate Pressure District

The Intermediate Pressure District is currently supplied from Coldbrook, which pumps directly out of the Low Pressure District, and two pressure regulating valves connected to the EHPD. One valve is located at Fuller Avenue and Three Mile, and the other near the intersection of Diamond Avenue and Baldwin Street. The Coldbrook Station will soon be decommissioned and its function moved to the Livingston Pump Station. Improvements to the Livingston Station are currently underway, including new pumps that will supply the Intermediate Pressure District after Coldbrook is taken offline. The Franklin Reservoir sits on the edge of the Intermediate Pressure District, but is hydraulically connected to the Low Pressure District. Booster A pumps from the Intermediate Pressure District into the EHPD.

2.5.2.4 East High Pressure District

The EHPD is supplied by the Livingston and Franklin Reservoirs. The hydraulic grade is controlled by the Knapp, Cambridge, and Patterson Elevated Storage Tanks. The Dean Lake Service Center Reservoir and East Paris Service Center Reservoir provide additional storage within the EHPD, and their respective pump stations pump water to the east side of the EHPD. Dean Lake Service Center can operate as an inline booster pump station and/or fill the reservoir directly from the EHPD and then pump the water back into the EHPD. The East Paris Service Center Reservoir is supplied from the Franklin Pump Station through the low-pressure Southeast Transmission Main (SETM). Water is pumped from the East Paris Service Center to the east side of the EHPD and fills the Patterson Elevated Tank.

East Grand Rapids and Ada Township are wholesale communities connected to the EHPD. East Grand Rapids has an elevated storage tank filled directly by the Franklin Pump Station. Ada Township uses booster pumps for its supply and to fill its elevated storage tank.

2.5.2.5 Tulip Pressure District

Supply to the Tulip Pressure District is through the Booster D Pump Station, which pumps from the Low Pressure District into the Tulip Tank. The Tulip Pressure District is normally hydraulically controlled by the tank. There is also a PRV located at Grant and Division that is used to supply demand in the Tulip Pressure District from the Intermediate Pressure District.

2.5.2.6 Alger Pressure District

The Alger Reservoir is filled from the Low Pressure District and the Alger Pump Station supplies the Alger Pressure District. The Alger Pump Station has both reservoir pumps and booster pumps, so the district can be supplied from the reservoir or directly from the Low Pressure District. There are also three PRVs that supply the Alger Pressure District from the EHPD. The PRVs are located at Blaine and Burton, Blaine and 28th Street, and Adams and Linden.

2.5.2.7 Regulated Pressure Districts

There are five regulated pressure districts in the distribution system that are supplied through and controlled by PRVs. The West Regulated and South Walker Regulated Pressure Districts are supplied by the West High Pressure District. The Cascade Regulated Pressure District is at a low elevation near the Thornapple River and is supplied by the EHPD. The 36th Street and 28th Street Regulated Pressure Districts, located at the southwest end of the EHPD, are also supplied by the EHPD.

2.5.2.8 Security Systems

The water system has several security measures. The LMFP is fenced and locked with security lighting and cameras. The LMFP is staffed 24 hours per day and operators monitor the LMFP

security system. All pumping stations have door alarms that transmit by telemetry to the LMFP. Most facilities are fenced and locked with security lighting. Booster A, Booster D, and Bristol Booster Pump Station are solid brick buildings. Ground tanks have bolted hatches. Elevated tanks are locked with alarms. Security cameras that transmit to the LMFP have been installed at Coldbrook, Livingston, Franklin, and Booster A. As street and utility work provide the opportunity for fiber optic installation, additional cameras will be installed. Recent improvements to security at the Alger Pump Station included an automated gate controller, which is opened using a passcode or remotely opened from the LMFP, a locked vandal guard on the reservoir ladder, and a locked hinged roof hatch access. Similar improvements will be made to pump stations and reservoirs that are scheduled for upgrades in the near future, including the Wilson and Livingston pump stations and reservoirs.

2.6 Summary of Project Need

2.6.1 System Needs

2.6.1.1 LMFP Residuals Handling Improvements

Residual solids generated from the LMFP clarification and filtration processes are currently dechlorinated and discharged to two unlined earthen lagoons that were constructed with the original water treatment facility in the early 1960s. The suspended solids settle to the bottom of the lagoons and are periodically removed by LMFP staff using earth moving equipment. The material is staged in a modified drying bed area, where it partially dries prior to being transported and disposed of in a landfill. Initially, the processed wastewater infiltrated into the ground. Over time, however, the soil pore space became partially plugged and required surface discharge of the process wastewater. Improvements were made during the 1990s plant expansion to accommodate increased drainage in the lagoons. This included an underdrain system, inlet/outlet structures, and dewatering pumps to expedite lagoon cleaning. Currently, settled water from the lagoons is discharged into Pigeon Creek to the south of the LMFP under a National Pollutant Discharge Elimination System (NPDES) permit. The performance of the 55+ year-old lagoon system is negatively impacted by high groundwater at the site.

The LMFP has multiple sources of process wastewater which are ultimately discharged to the existing lagoon system. Most of the solids that enter the lagoons originate from the sludge blowdown from the floc/sed basins. Solids were also discharged from the Accelators when they were in use. New pretreatment equipment that includes flocculators, inclined plate settlers, and vacuum sludge removal is currently under construction to replace the Accelators, and once this is complete, the new vacuum sludge collection equipment in the new pretreatment system will discharge solids to the existing lagoon system. Filter backwash water discharges into the lagoon system in large volumes, but has much lower solids concentrations. Tank drainage water with minimal solids is also discharged into the lagoons when process tanks are drained during periodic

maintenance. Multiple roof and floor drains with minimal solids also discharge into the lagoons from multiple locations within the plant.

Flow rates for the current sludge blowdown process from the floc/sed basins are not continuously metered. A temporary flow meter was installed on the sludge drain that confirmed plant estimates of a sludge blowdown rate of 700 gpm for 45 minutes per day for each basin. On low flow days, plant operators indicated that three basins are used. For average and high flow days, five or six basins are used for treatment. Each basin is blown down every day regardless of whether the basin is online or not. This corresponds to an average blowdown volume of 157,500 gpd (for five basins). The new vacuum sludge removal equipment in the pretreatment system will blow down at a rate of 250 gpm per basin and operate for 1.5 hours per day per basin. This will result in a 45,000-gallon total blow down for both basins per day.

Filter backwash water volumes were estimated using plant filter data showing approximately three backwashes on average per day. Although very rare, the plant will backwash a maximum of eight times per day during very high demand periods. Each filter backwash results in approximately 100,000 gallons discharged to the lagoons. This indicates that on an average day, 400,000 gpd (1.0% of treated water) will be used for filter backwashing.

Table 4 provides a summary of the residuals quantities that were developed in a current preliminary design project for the residual handling improvements. The dry solids (lb/day) were calculated using a production rate of 104 lb/MG of plant flow. This rate is based on the average alum dose of 13.2 milligrams per liter (mg/L), raw suspended solids of 5.5 mg/L, and powdered activated carbon (PAC) dose of 1.2 mg/L. The American Water Works Association (AWWA) Handbook Reference 11.1 was used to estimate the dry solids production rate using these values. It is assumed that the weight solids concentration in the sludge blowdown varied from 0.11% to 0.43% as plant production increased and more solids settle in the sedimentation basins. The dry solids (lb/day) discharged from the filter backwash are the differences between total dry solids production and the sedimentation blowdown dry solids values. The weight solids concentration for the filter backwash wash water was calculated to be approximately 0.01%.

Table 4 – Basis of Design for Residual Quantities

	Existing (2020)			Future (2040)		
	Minimum	Average	Maximum	Minimum	Average	Maximum
Plant Flow (MGD)	19.20	38.42	83.96	22.67	45.36	98.80
Dry Solids - Coagulant (lb/MG)	94	94	94	94	94	94
Dry Solids - PAC (lb/MG)	10	10	10	10	10	10
Dry Solids (lb/day)	2,003	4,008	8,758	2,365	4,732	10,306
Plate Settler Basins Underflow (gpd)	45,000	45,000	45,000	45,000	45,000	45,000
Wet Solids (lb/day)	375,300	375,300	375,300	375,300	375,300	375,300
Dry Solids (lb/day)	420	713	1,501	488	826	1,726
Floc/Sed Basins Underflow (gpd)	157,500	189,000	189,000	157,500	189,000	189,000
Wet Solids (lb/day)	1,313,550	1,576,260	1,576,260	1,313,550	1,576,260	1,576,260
Dry Solids (lb/day)	1,471	2,995	6,305	1,708	3,468	7,251
Filter Backwash Washwater (gpd)	100,000	300,000	1,000,000	200,000	400,000	1,125,000
Wet Solids (lb/day)	834,000	2,502,000	8,340,000	1,668,000	3,336,000	9,382,500
Dry Solids (lb/day)	111	300	952	169	438	1,329
Concentrated Residuals Flow (gpd)	202,500	234,000	234,000	202,500	234,000	234,000
Filter Backwash Washwater (gpd)	100,000	300,000	1,000,000	200,000	400,000	1,125,000
Total Residuals Flow (gpd)	302,500	534,000	1,234,000	402,500	634,000	1,359,000

For sedimentation: Minimum Flow: 0.11% solids; Average Flow: 0.21% solids; Maximum Flow: 0.43% solids
For filter backwash water: 0.01% solids

2.6.1.2 Franklin Street Pump Station Pump Replacement

Improvements at the Franklin Pump Station are needed to improve operation and efficiency. Pumps P-1, P-2, P-3, and P-4 are past their useful life and are experiencing increasingly serious operational issues. Pump P-2 has a synchronous motor and has not been operational for some time due to the deterioration of the suction piping to the pump. Pump P-4 was disconnected during upgrades to the station in 2014 and can only be run through the diesel engine drive. P-4 is typically only used in emergency situations and is undesirable to run due to vibration issues that occur because of its long intermediate shafting and issues with the mounting of the pump. New pumps that are sized to more efficiently meet the current and projected future demands and associated electrical improvements are needed to improve the reliability and energy efficiency of the pump station.

The Franklin Pump Station is the supply for the south half of the EHPD and performs many functions, including:

1. Supply to East Grand Rapids, a wholesale customer, including filling the East Grand Rapids Elevated Storage Tank and operation of the wholesale meter for billing.
2. Supplying the EHPD. This includes filling the Cambridge Elevated Storage Tank, which supplies peak demands and maintains the hydraulic grade line on the southeast side of the EHPD.

3. Filling the East Paris Service Center Reservoir through a dedicated low-pressure SETM that is metered to push water in an efficient manner further to the east to supply customers in Kentwood, Cascade Township, and Ada Township. Water is then pumped from the East Paris Service Center further to the east and into the Patterson Tank. This is typically done utilizing the low-pressure pumps in the station, P-7, P-8, and P-9.
4. Water from the station supplies a portion of water directly to Ada Township, a wholesale customer.
5. Water from the station supplies the 28th Street and 36th Street Regulated Pressure Districts through PRVs.
6. The high-pressure pumps (P-1 through P-6) can be used to supply the East Paris Reservoir through the SETM by opening Valve 1 in the station. This allows the City to bleed water from the EHPD into the SETM.

The Franklin Pump Station houses nine pumps in total. Along with P-1 through P-4, pumps P-5 and P-6 are high-pressure pumps used to supply the EHPD and East Grand Rapids. Pumps P-7, P-8, and P-9 are low-pressure pumps that pump directly to the East Paris Service Center through the 24-inch SETM. The high-pressure pumps (P-1 through P-6) can also be used to supply the East Paris Service Center if the low-pressure pumps are off. In this case, a pressure reducing valve is used to regulate the pressure to supply the East Paris Service Center from the EHPD.

A summary of the existing pumps at the Franklin Pump Station is shown in Table 5.

Table 5 – Franklin Pump Station Existing Pumps

Pump	Design Flow (mgd)	Design Head (ft)	Pump CL Elev. (ft)	Motor (HP)	Motor Voltage	Year Installed	Notes
P-1	10.0	200	747.28	450	440	1956	Constant Speed, 1175 rpm, VSC
P-2	14.0	220	748.55	700	440	1940	Constant Speed, 1200 rpm, VSC
P-3	6.0	175	747.17	250	440	1956	Constant Speed, 1180 rpm, VSC
P-4	16.0	200	744.76	600	--	1982	Engine Driven, 1415 rpm, HSC
P-5	8.0	220	746.25	450	460	1995	Variable Speed, 1190 rpm, HSC
P-6	12.0	220	745.98	600	460	1995	Variable Speed, 1185 rpm, HSC
P-7	11.5	75	745.98	200	460	1995	Variable Speed, 1185 rpm, HSC
P-8	11.5	75	745.98	200	460	1995	Variable Speed, 1185 rpm, HSC
P-9	11.5	75	745.98	200	460	1995	Constant Speed, 1185 rpm, HSC

VSC – Vertical Split Case
HSC – Horizontal Split Case

2.6.1.3 Distribution System

The proposed distribution system projects recommend action due to the presence of aged water main, dead-end lines, or lead services. To avoid redundancy, the concerns of each of these items are described below.

Aged Water Main

Failure of cast iron water mains and valves built before 1940 in the older parts of Grand Rapids are common, particularly during the winter months. This lessens the distribution system reliability and increases operation and maintenance efforts. The City's policy is to replace aged water mains with ductile iron pipe as streets are reconstructed. Aged water mains generally include lead service lines; it is best practice and most cost effective to replace both the water main and lead services concurrently.

Dead End Lines

Dead end lines result in a breakdown of chlorine residuals, thereby limiting their disinfection abilities. Chlorine residual also helps to keep lead out of solution, which is important where lead services and old water mains exist within the distribution system. The poor water quality is noticeable to residents and results in a lack of confidence in the safety of the water. For these reasons, dead-end lines are flushed approximately once every 30 days. Where feasible, dead-end lines are gradually being removed from the system to eliminate the associated maintenance and operation efforts and water safety concerns.

Lead Services

Lead water services are a known potential public health hazard. Many lead services still exist within older portions of the distribution system. These lead services need to be eliminated within the next 20 years to meet the requirements of the Safe Drinking Water Act.

2.6.1.3.1 College Avenue Water Main

Approximately 2,600 feet of 8-inch medium pressure (MP) water main built between 1897 and 1935 exist in College Avenue from Leonard Street to Sweet Street. The main services approximately 75 residential homes and 3 small businesses. It is made of cast iron and all services are made of lead.

The 8-inch water main (MP) represents the easternmost limits of the Intermediate Pressure District, but it remains connected by piping to the EHPD to the east. To isolate the districts, existing valves are closed on the easterly legs of seven intersections along this portion of College Avenue; the result is 3,300 feet of dead-end water main serving approximately 80 houses.

2.6.1.3.2 Straight Avenue SW and Wealthy Street SW Water Main

Approximately 950 feet of 6-inch water main (LP), built in 1890, exist in Straight Avenue from Wealthy to Emperor Streets and approximately 500 feet of 6-inch water main (LP), built in 1914, exist in Wealthy Street east of Straight Avenue. At the Straight/Emperor intersection, the 6-inch main connects to a 12-inch water main (LP) built in 1998. On the Wealthy Street end, the 6-inch main connects to an 8-inch water main built in 2001. Approximately 23 residential and 2 small industrial properties are currently served by the 6-inch main. The mains are made of cast iron and all services are made of lead.

In support of 20-year planning projections, the City has recommended upsizing the existing 6-inch main to a 12-inch water main when the aging main is replaced. This upsizing will complete a higher capacity loop to service potential redevelopment of the area from residential to industrial/commercial/institutional use.

2.6.1.3.3 Page, Carrier, Lister, and Plainfield Improvements

An existing 8-inch water main (LP) in Plainfield Avenue between Leonard and Grove Streets was built in 1996 and represents the easterly limits of the Low Pressure District. Currently, this district is isolated from the Intermediate Pressure District by four closed valves. Six dead-end lines exist, totaling approximately 3,050 feet of piping, and servicing approximately 60 residential properties and 5 small businesses. It is believed that these properties have copper water services within the right-of-way and lead service from the right-of-way to the building.

West of Plainfield Avenue approximately 350 feet of 6-inch (LP) water main built in 1908 exist in Page Street and approximately 280 feet of 6-inch (LP) water main built in 1904 exist in Lister Court. Approximately 13 residential properties and 1 small business are serviced directly by the main. The mains are made of cast iron and all services are made of lead.

2.6.1.3.4 Private Lead Service Line Replacement

Throughout older portions of the City of Grand Rapids, lead water services were installed from the water main in the street to the inside of individual homes and businesses. In recent years, the City has invested heavily in replacing the portion of these services within the public right-of-way with copper piping. Furthermore, the City has, with limited success, encouraged property owners to replace that portion of service on private property to copper piping as well.

The location and extent of all known lead services have been compiled by the City in order to develop a replacement schedule. The services fall in one of the four categories below.

1. Water service is all copper from the water main to the building. No improvement is required.

2. Water service is copper from the water main to the property line and lead from the property line to the building. Replacement of lead to copper is required on the private side of the property line.
3. Water service is lead on the City side of the property line and copper from the property line to the building. Replacement of lead to copper is required on the public side of the property line.
4. Water service is lead on both sides of the property line. The entire water service needs to be replaced with copper.

The focus of the proposed work is to address 1,235 homes that fall under Category 2. Several other projects presented in this Project Plan include Category 4 type lead service replacement, and the City is also working to address those services that fall into Category 3.

2.6.1.3.5 Giddings Avenue Water Main

Approximately 2,650 feet of 6-inch water main (HP) exist in Giddings Avenue from Burton to Boston Streets. The main was built in 1927 and directly serves approximately 60 residential properties. The main is made of cast iron and all services are made of lead.

2.6.1.3.6 Eleanor Street Water Main

Approximately 2,400 feet of 6-inch water main (MP) built prior to 1937 exist in Eleanor Street from Plainfield to Diamond Avenues. The main directly serves approximately 65 residential properties. Approximately 1,000 feet of this main is a dead-end line serving 27 properties. The main is made of cast iron and all services are made of lead.

The 6-inch water main represents the southeasterly limits of the EHPD, but it remains connected by piping to the Intermediate Pressure District to the south. Existing valves are always closed on the southerly legs of four intersections to isolate the districts. The result is an additional 2,600 feet of dead-end water main serving approximately 75 residential properties.

2.6.1.3.7 Plainfield Avenue Water Main

Approximately 3,350 feet of 12-inch cast iron water main (MP) built in 1925 exist in Plainfield Avenue from Halena to Ellsmere Streets. The main directly serves approximately 54 residential properties and 8 small businesses. It is believed that the 8 small businesses have copper services from the main to the building whereas the 54 residential properties are believed to be copper within the right-of-way and lead from the right-of-way to the home.

The 12-inch water main represents the easterly limits of the Intermediate Pressure District, but it remains connected by piping to the EHPD to the east. Existing valves always remain closed on the easterly legs of ten intersections to isolate the districts. The result is approximately 8,300 feet of dead-end water main serving approximately 230 residential properties.

2.6.1.3.8 Garfield Avenue Water Main

Approximately 2,300 feet of 6-inch water main (LP) built in 1908 exist in Garfield Avenue from Fuller to Veto and from California to Bridge Streets. Additionally, two side streets, Veto Street and California Street, each contain 350 feet of 6-inch water main (LP) built in 1925 and 1914 respectively. Approximately 65 residential properties are served by these mains. The mains are made of cast iron and all services are made of lead.

2.6.2 Compliance with Drinking Water Standards

EGLE issued a Sanitary Survey for the City of Grand Rapids Water System in 2017. The document listed numerous recommendations for the water system. The City has addressed several of the recommendations, but many others require substantial capital improvements, and some have been incorporated herein.

The 2017 Sanitary Survey evaluated compliance with the Lead and Copper Rule for the City of Grand Rapids. Since sampling for lead and copper began in 1997, the City has sampled more frequently than the requirement of Rule 710b (5) of Act 399 to ensure compliance is maintained. The City currently feeds blended phosphate to prevent leaching of lead and copper from the existing pipes, which has kept the lead levels below the action level of 15 parts per billion (ppb). Target levels for water quality parameters including pH, alkalinity, and phosphate levels were set by EGLE and the City for both the point of entry (where the water leaves the LMFP) and for locations in the distribution system. All point of entry samples (samples taken where water leaves the plant and enters the distribution system) since 2014 are in compliance with Act 399; however, samples taken from the distribution system have had multiple excursions since 2014. This was due to inaccurate sampling practices, which were corrected beginning in 2016. Since that time, the sampling issues have been resolved. In 2017, the City enacted a policy to replace public and private lead services when exposed due to construction or when leak repairs are needed. The City also provides a payment plan to customers seeking the replacements of lead service lines.

The lagoons at the LMFP overflow to Little Pigeon Creek. The City has an NPDES permit for discharge with a residual chlorine limit of 0.038 mg/L. Multiple exceedances of this limit have occurred since 2005, and a violation notice was issued on March 1, 2007. There have been no further violations since that time. The LMFP Residuals Handling Improvements is expected to reduce the chance for any future exceedances by installing a flow-paced dechlorination system just upstream of discharge to the lagoons.

The 2015 CMP describes water supply needs and deficiencies for the Grand Rapids distribution system and for the LMFP in Segments II and III. Many of the issues that were identified have since been addressed and corrected. The needs and deficiencies of the system and the LMFP will be evaluated and updated in the 2020 CMP, scheduled to be completed in the fall of 2020.

The initial work for the 2020 CMP update along with the City's maintenance record was used to select the projects identified in this report.

2.6.3 Orders or Enforcement Actions

No court or enforcement orders, or written enforcement actions have been issued to the City regarding the water system.

2.6.4 Drinking Water Quality Problems

The aesthetic quality of the water produced by the LMFP is generally good; there are no known drinking water problems in the overall distribution system. There have been occasional occurrences of taste and odor events, but they have been rare in the last decade and are not considered to be a major priority. The LMFP feeds carbon as needed to address taste and odor.

There have been water quality issues in select areas of the system. The water quality issues have led to customer complaints and frequent flushing of the water mains in these affected areas.

2.6.5 Projected Needs for the Next 20 Years

The CMP completed in 2015 outlined projected needs for the 20-year period from 2015 to 2035. Necessary water supply improvements were prioritized based on projected population and demand increases. The 2020 CMP, scheduled to be complete in November of 2020, will include updates since the previous CMP, and will evaluate the system for the 20-year period from 2020 to 2040.

Section 8.0 in Segment II of the 2015 CMP identified water system capital improvements for which funding had been planned. A summary of the projects and their estimated costs can be found in Table II-8-3 of that document. Many of the projects identified in the table have since been completed and the 2020 CMP Update will provide an updated list of planned capital improvements.

The 2015 CMP also evaluated anticipated growth and expansion of customer communities within the 20-year planning period and identified future water main needed to service potential growth. A similar evaluation will be performed for the 2020 CMP Update.

The 2017 Sanitary Survey identified deficiencies in the standby power in the water supply system and urged the City to focus on installing reliable power for use during normal operation and emergency conditions. As improvements to pump stations are implemented and as future improvements are considered, the City is actively addressing issues concerning standby power at each facility.

Modifications to improve the system's response to events related to extreme weather or other climatic factors are being addressed by the City through efforts to obtain FEMA grants for several

pump stations, which include Livingston, Dean Lake, Booster A, Alger, Franklin, Bristol, and Wilson. Proposed improvements include the installation of a combination of generator plugs, manual transfer switches, automatic transfer switches, and dedicated natural gas or portable diesel generators. Upgrading the alternative power sources at the selected pump stations is a cost-effective, long-term solution to protect the City's critical facilities. Generators with manual or automatic transfer switches will promote individual and community safety and resilience, reducing response and recovery resource requirements in the wake of a disaster or incident, and ultimately reducing the risk of loss of life and property from future disasters.

3.0 Analysis of Alternatives

3.1 LMFP Residuals Handling Improvements

3.1.1 No-Action

If no action is taken, the performance of the 55+ year-old lagoon system will continue to be negatively impacted by high groundwater at the site, which could cause future regulatory issues. The existing surface water discharge has occasionally been problematic due to chlorine exceedances of the NPDES permit, which may occur again if no action is taken. The LMFP staff will continue to remove the solids that settle in the lagoons using earth moving equipment before final transport and disposal to a landfill. Over time, the underdrain system in the lagoons may become plugged with solids, which would have a negative impact on the performance of the system. Because of the declining condition of the existing lagoons and the challenges associated with maintaining the NPDES permit, the No-Action alternative is not being considered further.

3.1.2 Optimum Performance of Existing Facilities

Operation of the existing lagoons and the existing residuals handling process has been optimized, but certain additions would further optimize residuals handling. The recommended residuals handling improvement project was developed as a result of three Fishbeck engineering studies for the Grand Rapids LMFP: *Technical Memorandum No. P-2: Residuals Handling Evaluation (June 2003)*, *Technical Memorandum No. P-19: Residuals Treatment Alternatives Evaluation (August 2010),* and *Lake Michigan Filtration Plant Pretreatment System Improvements Preliminary Design Report (December 2015).* Based on the findings of these studies, a preliminary design is currently underway for improvements to the residuals handling process and will be presented in a technical memorandum scheduled to be completed in April of 2020.

The alternatives carried forward from previous studies and discussed herein include:

1. Separate Residuals Treatment.
2. Combined Residuals Treatment.

3.1.2.1 Separate Residuals Treatment

To optimize the residuals handling process at the LMFP, new gravity thickeners and mechanical dewatering equipment are needed. The recommended LMFP residuals handling improvement would repurpose the east half of the existing Accelator building for the installation of the new equipment. The Accelator clarifiers are installed in square, flat-bottomed concrete basins that are in good condition, so implementation of this project would improve existing tank and building space utilization. An addition to the existing Accelator building would be constructed to the north of Basin No. 2 for the storage of additional equipment. Openings would be cut into the north wall of Basin No. 2 to allow passage between the new building addition and the existing basin.

This alternative would implement a process to collect the concentrated and dilute residuals from the LMFP for equalization (EQ), clarification, thickening, and mechanical dewatering treatment. Filter backwash water would initially be pumped to a two-chamber EQ tank constructed near the existing floc/sed basin building. The EQ tank would be capable of holding a volume of eight filter backwashes (800,000 gallons). A decant overflow of clarified water would be dechlorinated and sent to the lagoons. The remaining backwash water would be pumped from the EQ tank to redundant clarifiers, retrofitted into Basin No. 4 of the existing Accelator building. An anionic polymer would be added to the backwash water prior to entering the clarifiers to enhance settling.

Concentrated sludge blowdown from the floc/sed basins would be pumped to the existing Accelator building and combined with the sludge blowdown from plate settlers in Pretreatment Basins No. 1 and No. 2. Collected solids from the backwash water clarifiers would also be added to the concentrated residual waste stream. After adding polymer, the combined concentrated stream would enter redundant gravity thickeners retrofitted into Basin No. 2 of the existing Accelator building. Additional polymer would be added to the thickened sludge from the gravity thickeners prior to entering mechanical solids dewatering equipment. The dewatering equipment would be located in the building addition. The dry residual solids would be collected in dumpsters and landfilled.

Dilute streams of clarified effluent from the backwash water clarifiers, supernatant from the gravity thickeners, and pressate from the mechanical dewatering equipment would be combined, dechlorinated, and discharge to the existing lagoons. The flow would be metered as it is sent to the lagoons. After further settling in the lagoons, the clarified effluent would then be discharged to the surface water.

This alternative would include the following items:

- Site piping rerouting the existing floc/sed basin sludge blowdown.
- Booster pumps for the floc/sed sludge blowdown.
- Pump replacement for pumping filter backwash water to the new EQ tank.
- EQ tank for filter backwash water with decant system.
- A pump station for pumping filter backwash water from the EQ tank to the clarifiers.
- Site piping rerouting the filter backwash water.
- Two clarifiers and piping for filter backwash water.
- Additional piping within the Accelator Pipe Gallery for the combined residuals stream from the floc/sed basins concentrated blowdown, the clarifiers sludge, and the plate settlers concentrated blowdown.
- Pumps to feed gravity thickeners.
- Two gravity thickeners for concentrating the combined residuals stream.
- Reconfiguration of the east half of the Accelator basins for clarification and dewatering.
- Sludge pumping equipment to feed the mechanical dewatering equipment.

- Redundant mechanical dewatering equipment.
- Building addition to house mechanical dewatering equipment.
- Site piping for routing filtrate effluent.
- Polymer feed systems.
- Flow meter and bisulfite feed points for dechlorination prior to entering to the lagoons.

3.1.2.2 Combined Residuals Treatment

Another alternative is to combine all concentrated sludge with the filter backwash water prior to dewatering. Similar to the previous alternative, filter backwash water would be pumped to an EQ tank. Unlike the previous alternative, the concentrated sludge blowdown from the floc/sed basins would also be sent to the EQ tank. The EQ tank would have a capacity of 1 million gallons to hold eight filter backwash cycles, plus the additional blowdown volume from the floc/sed basins. The combined flow would be pumped to the existing Accelator building and combined with the concentrated sludge from the pretreatment plate settlers. The combined flow would then be sent to redundant clarifiers, retrofitted into Basin No. 4 of the existing Accelator building. The flow would then be sent to gravity thickeners, retrofitted into Basin No. 2, then sent through the mechanical dewatering equipment located in the building addition constructed to the north of Basin No. 2. The dry residual solids would be collected in dumpsters and landfilled. The clarifiers, gravity thickeners, and the dewatering equipment would be larger in this alternative because of the large volume of water in the combined flow.

Like the previous alternative, dilute streams of clarified effluent from the clarifiers, gravity thickeners, and dewatering equipment would be combined, dechlorinated, flow-metered, and discharge to the existing lagoons.

This alternative would include the following items:

- Site piping rerouting the existing floc/sed basin sludge blowdown.
- Pump replacement for pumping filter backwash water to the new EQ tank.
- EQ tank for filter backwash water and floc/sed sludge blowdown.
- A pump station for pumping the combined flow from the EQ tank to the clarifiers.
- Site piping rerouting the combined flow.
- Two clarifiers and piping for the combined flow.
- Additional piping within the Accelator Pipe Gallery for the combined filter backwash water, floc/sed basins concentrated blowdown, and the plate settlers concentrated blowdown.
- Pumps to feed gravity thickeners.
- Two gravity thickeners for concentrating the combined stream.
- Reconfiguration of the east half of the Accelator basins for clarification and dewatering.
- Sludge pumping equipment to feed the mechanical dewatering equipment.
- Redundant mechanical dewatering equipment.

- Building addition to house mechanical dewatering equipment.
- Site piping for routing filtrate effluent.
- Polymer feed systems.
- Flow meter and bisulfite feed points for dechlorination prior to entering to the lagoons.

3.1.3 Regional Alternatives

A regional alternative is not available.

3.2 Franklin Street Pump Station Pump Replacement

3.2.1 No-Action

If the four pumps are not replaced at the Franklin Pump Station, they will continue to degrade in performance until eventually, they fail. Currently, pumps P-2 and P-4 are not normally operated due to poor performance and will continue to remain offline if no action is taken. These four pumps are necessary to meet the demands of the system and to maintain reliability and operational flexibility at the pump station. Without their replacement, operations will continue to remain inefficient and maintenance costs will increase.

3.2.2 Optimum Performance of Existing Facilities

Significant modifications were added to the Franklin Pump Station in 1994 to optimize operation. The most important modifications were the addition of the dedicated SETM, a low-pressure transmission main from Franklin to East Paris, and the corresponding low-pressure pumps P-7, P-8, and P-9 at Franklin. Additional improvements were added to the station in 2014, which included replacing the motor starters for pumps P-5, P-6, P-7, and P-8 with VFDs. This modification helped alleviate issues and reduce energy costs when high-pressure pumps (P-5 and P-6) pumped to the ground level East Paris Reservoir through the SETM. The operation was also optimized for low-pressure pumps (P-7 and P-8) with this modification. With the addition of the VFDs, the low-pressure pumps can be adjusted in speed to fill the East Paris Reservoir through the SETM at a rate that matches pumpage out of the reservoir. Pumps P-1, P-2, P-3, and P-4 are single-speed pumps, and therefore, cannot be used with the operational flexibility that the other pumps are capable of.

To further optimize the Franklin Pump Station, existing pumps P-1, P-2, P-3, and P-4 should be replaced with new pumps: two 8.0 mgd pumps and two 12.0 mgd pumps. The addition of VFDs to some or all the pumps will introduce operational flexibility to optimize operations. Alternatives for this project include the following:

1. Pump Replacement with Four Separate VFDs.
2. Pump Replacement with Two Separate and One Shared VFD.

For either of these two alternatives, a new diesel generator should be installed inside the building along with necessary structural and mechanical modifications. This improvement will upgrade the emergency power to the station and enhance its reliability.

3.2.2.1 Pump Replacement with Four Separate VFDs

Four VFDs will allow for the greatest operational flexibility needed for the range of functions that the Franklin Pump Station performs. The speed of the pumps can be adjusted to meet the demands and fill the tanks in the East High and the East Grand Rapids Pressure Districts, without over pressurizing the systems. The adjustable speed will also allow for supply to the East Paris Reservoir from these high-pressure pumps.

3.2.2.2 Pump Replacement with Two Separate and One Shared VFD

Another alternative is to have the two 8.0 mgd pumps have their own VFDs and to have one VFD shared between the two 12.0 mgd pumps. Although this may reduce capital costs, this alternative would only allow one of the larger pumps to be operated at a time, which limits operation flexibility and redundancy at the station. The Franklin Pump Station performs a wide range of functions and is crucial for supply to multiple pressure districts, so operation flexibility is a priority for this project. For this reason, installing a shared VFD will not be considered further.

3.2.3 Regional Alternatives

A regional alternative is not available.

3.3 College Avenue Water Main

3.3.1 No-Action

The No-Action alternative would result in the continued need for monthly flushing of approximately 3,300 feet of dead-end water main to maintain water quality and limit customer complaints and concerns. Additionally, approximately 78 lead services and 2,600 feet of 8-inch water main that have exceeded its design life would remain. The 78 lead services would need to be replaced within 20 years to comply with the Safe Drinking Water Act.

3.3.2 Optimum Performance of Existing Facilities

The existing 8-inch water main (MP) and water services have exceeded their design lives and no longer function optimally, nor do they meet current City design and operational expectations and standards.

3.3.3 Construction Alternatives

3.3.3.1 New 8-inch MP and HP Water Mains and Services

- Replace the approximately 2,600 feet of existing 8-inch water main with new 8-inch water main medium pressure (MP) between Leonard Street and Sweet Street.
- Place approximately 1,550 feet of new 8-inch water main high pressure (HP) adjacent to new 8-inch water main (MP) between Carrier Street and Curtis Street, and between Spencer Street and Kent Hills Road; install and open new valves on side streets, thereby eliminating all dead-end lines.
- Replace approximately 78 lead services (including the portions on private property) with copper services.

3.3.3.2 New 8-inch HP Water Main and Services

- Place approximately 1,550 feet of new 8-inch water main (HP) adjacent to new 8-inch water main (MP) between Carrier Street and Curtis Street, and between Spencer Street and Kent Hills Road; install and open new valves on side streets, thereby eliminating all dead-end lines.
- Replace approximately 78 lead services (including the portions on private property) with copper services.

3.3.4 Regional Alternatives

A regional alternative is not available.

3.4 Straight Avenue SW and Wealthy Street SW Water Main

3.4.1 No-Action

Approximately 1,450 feet of 6-inch water main have exceeded their design life; in the No-Action alternative, this water main would remain in service. The 23 lead services would need to be replaced within 20 years to comply with the Safe Drinking Water Act.

3.4.2 Optimum Performance of Existing Facilities

The existing 6-inch water main (LP) and water services have exceeded their design lives and no longer function optimally, nor do they meet current City design and operational expectations and standards.

3.4.3 Construction Alternatives

3.4.3.1 New 12-inch LP Water Main and Services

- Replace approximately 950 feet of existing 6-inch water main with new 12-inch water main (LP) in Straight Avenue between Wealthy and Emperor Streets.
- Replace approximately 500 feet of existing 6-inch water main with new 12-inch water main (LP) in Wealthy Street from Straight Avenue to the east.
- Replace approximately 23 lead services (including the portions on private property) with copper services.

3.4.3.2 New Services

- Replace approximately 23 lead services (including the portions on private property) with copper services.

3.4.4 Regional Alternatives

A regional alternative is not available.

3.5 Page, Carrier, Lister, and Plainfield Improvements

3.5.1 No-Action

The No-Action alternative would result in the continued need for monthly flushing of approximately 3,050 feet of dead-end water main to maintain water quality, and limit customer complaints and concerns. Additionally, approximately 79 lead services and 630 feet of 8-inch water main that have exceeded their design life would remain. The 79 lead services would need to be replaced within 20 years to comply with the Safe Drinking Water Act.

3.5.2 Optimum Performance of Existing Facilities

The existing 6-inch water main (LP) and water services in Page Street and Lister Court have exceeded their design lives and no longer function optimally, nor do they meet current City design and operational expectations and standards.

3.5.3 Construction Alternatives

3.5.3.1 New 6- and 8-inch MP Water Main and Services

- Place approximately 120 feet of 8-inch water main (MP) in the Plainfield/Leonard Intersection to convert 8-inch water main from low to medium pressure. Open the four closed valves on side streets, thereby eliminating four dead-end lines.

- Replace approximately 350 feet of existing 6-inch water main with new 6-inch water main (MP) in Page Street west of Plainfield Avenue.
- Replace approximately 280 feet of existing 6-inch water main with new 6-inch water main (MP) in Lister Court west of Plainfield Avenue.
- Place approximately 200 feet of new 6-inch water main (MP) between Page Street and Lister Court to eliminate the dead-ends.
- Replace approximately 14 lead services (including the portions on private property) in Lister Court and Page Street with copper services.
- Replace approximately 65 private side lead services in Plainfield Avenue, Carrier Street, and Page Street with copper services.

3.5.3.2 New Services and 8-inch Connection at Plainfield/Leonard Intersection

- Place approximately 125 feet of 8-inch water main MP in the Plainfield/Leonard Intersection to convert 8-inch water main from low to medium pressure. Open the four closed valves on side streets, thereby eliminating four dead-end lines.
- Replace approximately 65 private side lead services in Plainfield Avenue, Carrier Street, and Page Street with copper services.

3.5.4 Regional Alternatives

A regional alternative is not available.

3.6 Private Lead Service Line Replacement

3.6.1 No-Action

The 1,235 lead services would need to be replaced within 20 years to comply with the Safe Drinking Water Act.

3.6.2 Optimum Performance of Existing Facilities

Lead is no longer an acceptable material for water services.

3.6.3 Construction Alternatives

3.6.3.1 New Private Side Services

Replace approximately 1,235 private side lead services with copper services.

3.6.4 Regional Alternatives

A regional alternative is not available.

3.7 Giddings Avenue Water Main

3.7.1 No-Action

Approximately 2,650 feet of 6-inch water main have exceeded their design life; in the No-Action alternative, this water main would remain in service. The 60 lead services would need to be replaced within 20 years to comply with the Safe Drinking Water Act.

3.7.2 Optimum Performance of Existing Facilities

The existing 6-inch water main (HP) and water services have exceeded their design lives and no longer function optimally, nor do they meet current City design and operational expectations and standards.

3.7.3 Construction Alternatives

3.7.3.1 New 8-inch HP Water Main and Services

- Replace approximately 2,650 feet of the existing 6-inch water main with new 8-inch water main (HP) between Burton and Boston Streets.
- Replace approximately 60 lead services (including the portions on private property) with copper services.

3.7.3.2 New Services

Replace approximately 60 lead services (including the portions on private property) with copper services.

3.7.4 Regional Alternatives

A regional alternative is not available.

3.8 Eleanor Street Water Main

3.8.1 No-Action

The No-Action alternative would result in the continued need for monthly flushing of approximately 3,600 feet of dead-end water main to maintain water quality and limit customer complaints and concerns. Additionally, approximately 65 lead services and 2,400 feet of 6-inch water main that

have exceeded their design life would remain. The 65 lead services would need to be replaced within 20 years to comply with the Safe Drinking Water Act.

3.8.2 Optimum Performance of Existing Facilities

The existing 6-inch water main (HP) and water services have exceeded their design lives and no longer function optimally, nor do they meet current City design and operational expectations and standards.

3.8.3 Construction Alternatives

3.8.3.1 New 6-inch HP and 8-inch MP Water Main and Services

- Replace approximately 1,000 feet of existing 6-inch water main with new 8-inch water main (MP) between Plainfield and Eastern Avenues.
- Replace approximately 1,400 feet of existing 6-inch water main with new 6-inch water main (HP) from Eastern to Diamond Avenues.
- Install and open new valves on side streets, thereby eliminating all dead-end lines.
- Replace approximately 65 lead services (including the portions on private property) with copper services.
- Disconnect Pressure Districts and New Services.
- Keep the existing 6-inch water main in service but physically disconnect the EHPD from the Intermediate Pressure District at the Eleanor/Eastern intersection; open existing valves on side streets, thereby eliminating all dead-ends.
- Replace approximately 65 lead services (including the portions on private property) with copper services.

3.8.4 Regional Alternatives

A regional alternative is not available.

3.9 Plainfield Avenue Water Main

3.9.1 No-Action

The No-Action alternative would result in the continued need for monthly flushing of approximately 8,300 feet of dead-end water main to maintain water quality, and limit customer complaints and concerns. Additionally, 3,700 feet of 12-inch water main that have exceeded its design life would remain. Approximately 54 private side lead services would remain in place.

3.9.2 Optimum Performance of Existing Facilities

The existing 12-inch water main (MP) has exceeded its design life and cannot function to separate the two pressure districts. The water main no longer functions optimally, nor does it meet current City design and operational expectations and standards.

3.9.3 Construction Alternatives

3.9.3.1 New 8-inch HP and 12-inch MP Water Mains and Services

- Replace approximately 3,350 feet of existing 12-inch water main with new 12-inch water main (MP) in Plainfield Avenue between Halena and Ellsmere Streets.
- Place approximately 3,000 feet of new 8-inch water main (HP) in Plainfield Avenue between Halena and Arlington Streets and between Beechwood and Ellsmere Streets.
- Install and open new valves on side streets thereby eliminating all dead-end lines.
- Replace private side lead services to approximately 54 homes.

3.9.3.2 New 8-inch HP Water Main and Services

- Place approximately 3,000 feet of new 8-inch water main (HP) in Plainfield Avenue between Halena and Arlington Streets, and between Beechwood and Ellsmere Streets.
- Install and open new valves on side streets thereby eliminating all dead-end lines.
- Replace private side lead services to approximately 54 homes.

3.9.4 Regional Alternatives

A regional alternative is not available.

3.10 Garfield Avenue Water Main

3.10.1 No-Action

Approximately 3,000 feet of 6-inch water main have exceeded its design life; in the No-Action alternative, this water main would remain in service. The 65 lead services would need to be replaced within 20 years to comply with the Safe Drinking Water Act.

3.10.2 Optimum Performance of Existing Facilities

The existing 6-inch water main (LP) and water services have exceeded their design lives and no longer function optimally, nor do they meet current City design and operational expectations and standards.

3.10.3 Construction Alternatives

3.10.3.1 New 6- and 8-inch LP Water Main and Services

- Replace approximately 2,300 feet of existing 6-inch water main with new 8-inch water main (LP) between Fulton and Bridge Streets.
- Replace approximately 700 feet of existing 6-inch water main with new 6-inch water main (LP) in Veto and California Streets between Valley and Garfield Avenues.
- Replace approximately 65 lead services (including the portions on private property) with copper services.

3.10.3.2 New Services

Replace approximately 65 lead services (including the portions on private property) with copper services.

3.10.4 Regional Alternatives

A regional alternative is not available.

4.0 Principal Alternatives

4.1 LMFP Residuals Handling Improvements

4.1.1 Monetary Evaluation

A cost-effective analysis was completed for each of the two optimization alternatives. The project budgetary cost summary for *Separate Residuals Treatment* is presented in Table 6. The project budgetary cost summary for *Combined Residuals Treatment* is presented in Table 7.

Table 6 – Estimated Project Cost Summary for Separate Residuals Treatment Alternative

Item	Initial Capital Cost	Design Life (years)	Salvage Value
Demolition & Tank Modifications	$3,850,000	30	$1,283,333
EQ Tanks	$1,800,000	30	$600,000
Pump Stations	$540,000	20	$0
Clarifiers	$350,000	20	$0
Gravity Thickening Equipment	$740,000	20	$0
Mechanical Dewatering Equipment	$1,140,000	20	$0
Piping, Valves, & Gates	$1,000,000	50	$600,000
Civil Site Piping and Utilities	$2,500,000	50	$1,500,000
Electrical & Instrumentation	$1,700,000	20	$0
Subtotal: Estimated Construction Cost	$13,620,000		
Administration, Engineering, Contingency	$4,760,000		
Total: Estimated Project Budget	$18,380,000		

Table 7 – Estimated Project Cost Summary for Combined Residuals Treatment Alternative

Item	Initial Capital Cost	Design Life (years)	Salvage Value
Demolition & Tank Modifications	$3,850,000	30	$1,283,333
EQ Tanks	$2,160,000	30	$720,000
Pump Stations	$648,000	20	$0
Clarifiers	$420,000	20	$0
Gravity Thickening Equipment	$420,000	20	$0
Mechanical Dewatering Equipment	$888,000	20	$0
Piping, Valves, & Gates	$1,368,000	50	$820,800
Civil Site Piping and Utilities	$1,200,000	50	$720,000
Electrical & Instrumentation	$1,700,000	20	$0
Subtotal: Estimated Construction Cost	$14,734,000		
Administration, Engineering, Contingency	$5,160,000		
Total: Estimated Project Budget	$19,894,000		

Table 8 shows a side-by-side comparison of the present worth analysis for the two optimization alternatives.

Table 8 – 20-Year Present Worth Analysis: LMFP Residuals Handling System Improvements

Alternatives	Separate Residuals Treatment		Combined Residuals Treatment	
	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth
Capital Cost	$18,380,000	$18,380,000	$19,894,000	$19,894,000
O&M Cost/Year	$0	$0	$7,000	$135,700
Salvage Value	$3,984,000	($3,752,300)	$3,545,000	($3,338,900)
Total Worth		$14,627,700		$16,690,800

4.1.2 Environmental Evaluation

4.1.2.1 Cultural Resources

The LMFP Residuals Handling Improvements project is in a previous construction area and no direct historical or archeological impact is expected. There are no historical sites in the vicinity of the project.

4.1.2.2 The Natural Environment

Most of the work for both alternatives would occur inside the existing buildings at the LMFP property, with limited work occurring outside of the building in the proximity of the building footprints. The effects on the natural environment do not differ between optimization alternatives. As summarized in Appendix 2, the only anticipated impact to the natural environment is a temporary decrease in air quality due to construction.

4.1.3 Mitigation

Mitigation of environmental impacts will include best construction practices such as soil erosion prevention techniques, maintenance of construction equipment, and limiting construction to regular working hours during the week.

4.1.4 Implementability and Public Participation

The project plan will be available for public review. If at that time it becomes apparent that an alternative is not acceptable to the public, the alternatives will be reevaluated. Implementability of the project was evaluated. The proposed improvements will create new operation and maintenance requirements, but some existing maintenance issues will be eliminated. Although the LMFP staff will need to be trained in the operation and maintenance of the proposed equipment, the current process of removing and disposing of residuals using earth moving equipment will no longer be needed. There are no competing uses for the proposed site and the project does not require intermunicipal agreements.

4.1.5 Technical Considerations

Either of the two action alternatives would meet regulatory standards as well as improve the reliability of the residuals handling process. The design for either of these alternatives includes redundant units for the mechanical dewatering equipment, gravity thickeners, and clarifiers. For the *Separate Residuals Treatment* alternative, the EQ tank for the filter backwash water would be sized to hold eight filter backwash cycles and would have two chambers so that operation can be maintained while the tank undergoes maintenance. For the *Combined Residuals Treatment* alternative, the EQ tank for the combined flow from the filter backwash and the floc/sed sludge blowdown would be sized to hold eight filter backwash cycles, plus additional storage to accommodate the blowdown. Again, the tank would have two chambers so that operation can be maintained. All pumping equipment would have redundant units to improve reliability.

For either of the two action alternatives in the event of emergencies, the existing lagoons provide additional redundancy to the system and would function using the existing operation.

4.1.6 Residuals

The alternatives have no impact on the production of residuals. The project improves the handling and disposal of all residuals currently being generated at the LMFP.

4.1.7 Industrial/Commercial/Institutional

Increased industrial/commercial/institutional water usage would not affect the design of the alternatives for residuals handling improvements at the LMFP. If water production at the LMPF increases, residuals quantities may increase. The design of the proposed alternatives considers the projected 2040 residual quantities.

4.1.8 Growth Capacity

The residuals handling improvement alternatives consider the projected 2040 residuals production quantities. The proposed system includes redundant equipment that can be used if needed, due to growing demand from the LMFP.

4.1.9 Contamination

There are no contaminated sites located near the project site. A survey was performed in 2017 for lead and asbestos inside the existing Accelator building at the LMFP, which confirmed contaminants were not present.

4.2 Franklin Street Pump Station Pump Replacement

4.2.1 Monetary Evaluation

The cost-effective analysis was completed for the viable optimization alternative and for the No-Action alternative. The project budgetary cost summary for *Pump Replacement with Four Separate VFDs* is presented in Table 9.

Table 9 – Estimated Project Cost Summary for Pump Replacement with Four Separate VFDs Alternative

Item	Initial Capital Cost	Design Life (years)	Salvage Value
Demolition	$137,000	permanent	$0
New Pumps & Motors	$620,000	20	$0
Piping & Valves	$920,000	50	$552,000
Building Improvements (Structural & HVAC)	$220,000	50	$132,000
Permanent Generator	$640,000	20	$0
VFDs, Electrical	$650,000	20	$0
Subtotal: Estimated Construction Cost	$3,187,000		
Administration, Engineering, Contingency	$1,110,000		
Total: Estimated Project Budget	$4,297,000		

A present worth analysis was completed for the replacement of four pumps, each with a VFD, and the No-Action alternative. The No-Action alternative has no associated capital costs. Table 10 shows the comparison of the present worth analysis for the alternatives.

Table 10 – 20-Year Present Worth Analysis: Franklin Street Pump Station Pump Replacement

Alternatives	Pump Replacement with Four Separate VFDs		No-Action	
	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth
Capital Cost	$4,297,000	$4,297,000	$0	$0
O&M Cost/Year	$0	$0	--	--
Salvage Value	$684,000	($644,200)	$0	$0
Total Worth		$3,652,800		$0

4.2.2 Environmental Evaluation

4.2.2.1 Cultural Resources

The proposed project is within an existing structure. There will be no direct impact on any historical sites during the construction of the project.

4.2.2.2 The Natural Environment

As summarized in Appendix 2, the only anticipated impact to the natural environment is a temporary decrease in air quality due to construction.

4.2.3 Mitigation

The impact on air quality will be controlled to the greatest extent possible by limiting construction to regular working hours during the week.

4.2.4 Implementability and Public Participation

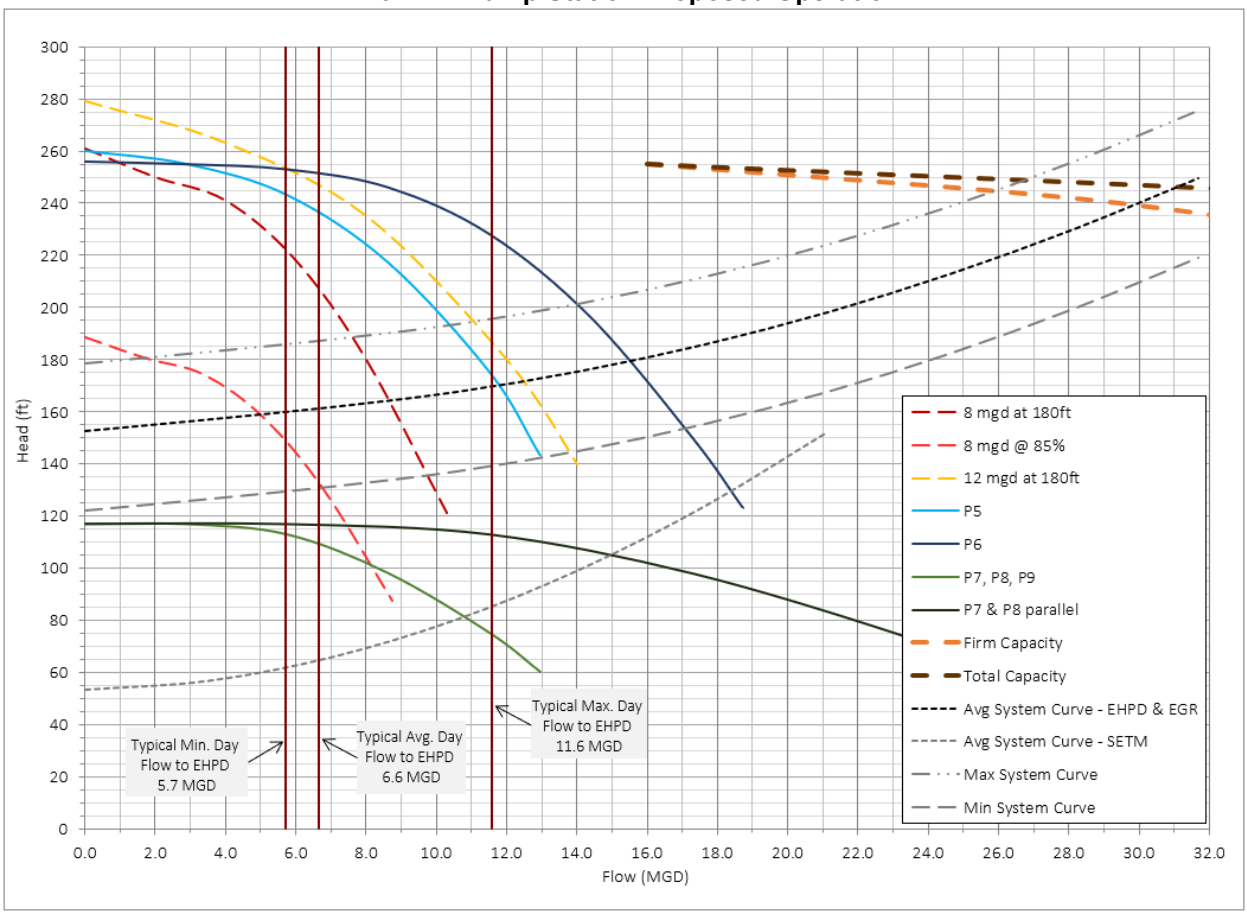
The project plan will be available for public review. If at that time it becomes apparent an alternative is not acceptable to the public, the alternatives will be reevaluated. Implementability of the project was evaluated. The proposed improvements will not further contribute to the existing operation and maintenance of the Franklin Pump Station. There are no competing uses for the proposed site and the project does not require intermunicipal agreements.

4.2.5 Technical Considerations

The Franklin Pump Station currently operates in accordance with regulations, so the No-Action alternative would not cause regulatory concerns. However, the reliability of the system is at risk due to the age of the pumps.

For the pump replacement alternative, the new pumps P-1, P-2, P-3, and P-4 will be sized to more efficiently meet the current and projected future demands for the pressure districts supplied by the pump station. The four new pumps will be equipped with VFDs to provide the operational flexibility that is needed for the functions of the Franklin Pump Station. Pump curves for the existing pumps that are to remain and pump curves for the proposed pumps are included in this section. Also shown in the image are typical minimum day, average day, and maximum day flows from the Franklin Pump Station to the EHPD based on operating records. The firm capacity of the Franklin Pump Station with the largest pump out of service (P-6) will be 30.0 mgd with a maximum capacity of 31.0 mgd.

Franklin Pump Station Proposed Operation



To improve the reliability of the station, a new 800kW, 480V diesel generator will be installed inside the building. The existing structure can support the generator, so no structural modifications will be required. A room with the proper fire rating will need to be built around the generator and the heating, ventilation, and air conditioning (HVAC) equipment serving the room will need to be able to exhaust and supply the required amount of air per the selected generator. There is an existing diesel fuel tank onsite that will be replaced with a new tank, and a small day tank will be installed inside the station near the generator. This will allow the station to power a combination of two pumps at a time totaling no more than 700HP.

4.2.6 Residuals

The project will have no impact on residuals.

4.2.7 Industrial/Commercial/Institutional

Industrial/commercial/institutional usage has been considered in the development of the demand projections for the Study Area. The current (2015) and future (2035) demands, as outlined in the 2015 CMP, were used to develop the alternatives for pump replacement at the Franklin Pump Station.

4.2.8 Growth Capacity

The Franklin Pump Station will provide water for growth as projected in the 2015 CMP. The Franklin Pump Station helps to supply areas that are expected to increase in connected population over the next 20 years for both commercial and residential development. This has been considered in the development of the demand projections for the Study Area.

4.2.9 Contamination

There are no contaminated sites located near the project site. All modifications will be occurring within the existing structure. There is no known contamination at the project site.

4.3 College Avenue Water Main

4.3.1 Monetary Evaluation

A cost-effective analysis was completed for the two construction alternatives and for the No-Action alternative. The project budgetary cost summary for the two construction alternatives is presented in Table 11 and Table 12 below. The cost estimates include the restoration of curb, pavement, sidewalk, grass, and other items required to complete the improvements.

Table 11 – Estimated Project Cost Summary for New 8-inch MP and HP Water Mains and Services

Item	Initial Capital Cost	Design Life (years)	Salvage Value
New 8-inch MP and HP Water Mains	$1,133,000	50	$679,800
New Copper Services	$195,000	50	$117,000
City Street Reconstruction	$611,000	10	$0
Contamination Allowance	$20,000	NA	NA
Subtotal: Estimated Construction Cost	$1,959,000		
Administration, Engineering, Contingency	$667,000		
Total: Estimated Project Budget	$2,626,000		

Table 12 – Estimated Project Cost Summary for New 8-inch HP Water Main and Services

Item	Initial Capital Cost	Design Life (years)	Salvage Value
New 8-inch HP Water Main	$710,000	50	$426,000
New Copper Services	$245,000	50	$147,000
City Street Reconstruction	$383,000	10	0
Contamination Allowance	$20,000	0	0
Subtotal: Estimated Construction Cost	$1,358,000		
Administration, Engineering, Contingency	$462,000		
Total: Estimated Project Budget	$1,820,000		

A present worth analysis was completed for the two construction alternatives and for the No-Action alternative, as summarized in Table 13. The No-Action alternative has no associated capital costs. Sunk costs are not included in the analysis.

Table 13 – 20-Year Present Worth Analysis: College Avenue Water Main

Alternatives	New 8-inch MP and HP Water Mains and Services		New 8-inch HP Water Main and Services		No-Action	
	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth
Capital Cost	$2,626,000	$2,626,000	$1,820,000	$1,820,000	$0	$0
O&M Cost/Year	$0	$0	$0	0	$16,800	$325,600
Salvage Value	$796,800	($751,000)	$573,000	($540,000)	$0	$0
Total Worth		$1,875,000		$1,280,000		$325,600

4.3.2 Environmental Evaluation

4.3.2.1 Cultural Resources

The College Avenue Water Main project is in a previous construction area and no direct historical or archeological impact is expected. There are no historical sites in the vicinity of the project.

4.3.2.2 The Natural Environment

The effects on the natural environment do not differ between construction alternatives. As summarized in Appendix 2, the only anticipated impact to the natural environment is a temporary decrease in air quality due to construction.

4.3.3 Mitigation

The impact on air quality will be controlled to the greatest extent possible by limiting construction to regular working hours during the week.

4.3.4 Implementability and Public Participation

Both construction alternatives would occur within the existing City of Grand Rapids public right-of-way dedicated for public utilities and roadways, except for the required replacement of lead services from the right-of-way limits to the houses. The City will cover the cost of the work on private property. No expense to the home-owner is anticipated for lead service replacement.

Appendix 3 provides detailed information on lead service line replacement public outreach and construction techniques.

4.3.5 Technical Considerations

4.3.5.1 No-Action

Dead end line operation and maintenance (O&M) and water main age concerns are not addressed. Within 20 years, the lead services would need to be replaced to meet compliance requirements.

4.3.5.2 New 8-inch MP and HP Water Mains and Services

- Water main age addressed.
- Dead-end line O&M addressed.
- Lead service compliance requirements are met.

4.3.5.3 New 8-inch HP Water Main and Services

- Dead-end line O&M addressed.
- Lead service compliance requirements are met.

4.3.6 Residuals

This project will have no impact on residuals.

4.3.7 Industrial/Commercial/Institutional

Except for three small local businesses, all properties served by the water mains are residential homes. Industrial/commercial/institutional usage does not require consideration in this case.

4.3.8 Growth Capacity

The purpose of the proposed project is to serve existing customers. The water main is not being installed for growth.

4.3.9 Contamination

There are several Part 201 Sites and leaking underground storage tanks (LUSTs) located near the project area. Depending on the size of the plume, the sites listed in Appendix 2 could impact the proposed project. Map 1 shows the location of the project in relation to the contaminated sites.

4.4 Straight Avenue SW and Wealthy Street SW Water Main

4.4.1 Monetary Evaluation

The cost-effective analysis was completed for the two construction alternatives and for the No-Action alternative. The project budgetary cost summary for the two construction alternatives is presented in Table 14 and Table 15 below. The cost estimates include the restoration of curb, pavement, sidewalk, grass, and other items required to complete the improvements.

Table 14 – Estimated Project Cost Summary for New 12-inch LP Water Main and Services

Item	Initial Capital Cost	Design Life (years)	Salvage Value
New 12-inch LP Water Main	$565,000	50	$339,000
New Copper Services	$58,000	50	$34,800
City Street Reconstruction	$305,000	10	$0
Contamination Allowance	$20,000	NA	NA
Subtotal: Estimated Construction Cost	$948,000		
Administration, Engineering, Contingency	$323,000		
Total: Estimated Project Budget	$1,271,000		

Table 15 – Estimated Project Cost Summary for New Services

Item	Initial Capital Cost	Design Life (years)	Salvage Value
New Copper Services	$115,000	50	$69,000
Subtotal: Estimated Construction Cost	$115,000		
Administration, Engineering, Contingency	$40,000		
Total: Estimated Project Budget	$155,000		

A present worth analysis was completed for the two construction alternatives and for the No-Action alternative, as summarized in Table 16. The No-Action alternative has no associated capital costs. Sunk costs are not included in the analysis.

Table 16 – 20-Year Present Worth Analysis: Straight Avenue SW and Wealthy Street SW Water Main

Alternatives	New 12-inch LP Water Main and Services		New Services		No-Action	
	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth
Capital Cost	$1,271,000	$1,271,000	$155,000	$155,000	$0	$0
O&M Cost/Year	$0	$0	$0	$0	$0	$0
Salvage Value	$373,800	($353,000)	$69,000	($65,000)	$0	$0
Total Worth		$918,000		$90,000		$0

4.4.2 Environmental Evaluation

4.4.2.1 Cultural Resources

The Straight Avenue SW and Wealthy Street SW Water Main project is in a previous construction area and no direct historical or archeological impact is expected. There are no historical sites in the vicinity of the project.

4.4.2.2 The Natural Environment

The effects on the natural environment do not differ between construction alternatives. As summarized in Appendix 2, the only anticipated impact to the natural environment is a temporary decrease in air quality due to construction. Although the proposed project is in the vicinity of several resources, no effect is anticipated.

4.4.3 Mitigation

The impact on air quality will be controlled to the greatest extent possible by limiting construction to regular working hours during the week. During construction, erosion control measures will be taken to prevent impact on the Grand River and nearby wetlands.

4.4.4 Implementability and Public Participation

Both construction alternatives would involve work within and outside of the existing City of Grand Rapids public right-of-way. The City will cover the cost of the work on private property. No expense to the home-owner is anticipated for lead service replacement.

Appendix 3 provides detailed information on lead service line replacement public outreach and construction techniques.

4.4.5 Technical Considerations

4.4.5.1 No-Action

Water main age and capacity concerns based on 20-year planning projections are not addressed. Within 20 years, the lead services would need to be replaced to meet compliance requirements.

4.4.5.2 New 12-inch LP Water Main and Services

- Water main age addressed.
- Water main capacity concerns based on 20-year planning projects are addressed.
- Lead service compliance requirements are met.

4.4.5.3 New Services

- Lead service compliance requirements are met.
- Roadway patched for lead service replacements.

4.4.6 Residuals

This project will have no impact on residuals.

4.4.7 Industrial/Commercial/Institutional

The potential exists for the redevelopment of properties directly served by the main from residential to industrial/commercial/institutional usage of some kind. The potential for redevelopment along Wealthy Street west of Straight Avenue also exists. This potential industrial/commercial/institutional usage has been considered in the development of the *New 12-inch LP Water Main and Services* alternative.

4.4.8 Growth Capacity

The upsizing of the water main recommended in the *New 12-inch LP Water Main and Services* alternative is based on 20-year planning projections that include the potential redevelopment of the area from residential to industrial/commercial/institutional usage.

4.4.9 Contamination

There are several Part 201 Sites and LUSTs located near the project area. Depending on the size of the plume, the sites listed in Appendix 2 could impact the proposed project. Sites summarized in the appendix are on the west side of the Grand River; it is assumed contamination would not cross the Grand River, and therefore, those sites are not in the list below. Map 1 shows the location of the project in relation to the contaminated sites.

4.5 Page, Carrier, Lister, and Plainfield Improvements

4.5.1 Monetary Evaluation

The cost-effective analysis was completed for the two construction alternatives and for the No-Action alternative. The project budgetary cost summary for the two construction alternatives is presented in Table 17 and Table 18 below. The cost estimates include the restoration of curb, pavement, sidewalk, grass, and other items required to complete the improvements.

Table 17 – Estimated Project Cost Summary for New 6- and 8-inch MP Water Main and Services

Item	Initial Capital Cost	Design Life (years)	Salvage Value
New 6-and 8-inch MP Water Mains	$277,000	50	$166,200
New Copper Services	$395,000	50	$237,000
City Street Reconstruction	$149,000	10	0
Contamination Allowance	$20,000	NA	NA
Subtotal: Estimated Construction Cost	$841,000		
Administration, Engineering, Contingency	$287,000		
Total: Estimated Project Budget	$1,128,000		

Table 18 – Estimated Project Cost Summary for New Services and 8-inch Connection at Plainfield/Leonard Intersection

Item	Initial Capital Cost	Design Life (years)	Salvage Value
New 8-inch MP Water Main	$64,000	50	$38,400
New Copper Services	$325,000	50	$195,000
City Street Reconstruction	$75,000	10	0
Contamination Allowance	$10,000	0	0
Subtotal: Estimated Construction Cost	$474,000		
Administration, Engineering, Contingency	$162,000		
Total: Estimated Project Budget	$636,000		

A present worth analysis was completed for the two construction alternatives and for the No-Action alternative, as summarized in Table 19. The No-Action alternative has no associated capital costs. Sunk costs are not included in the analysis.

Table 19 – 20-Year Present Worth Analysis: Page, Carrier, Lister, and Plainfield Improvements

Alternatives	New 12-inch LP Water Main and Services		New Services		No-Action	
	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth
Capital Cost	$1,128,000	$1,128,000	$636,000	$636,000	$0	$0
O&M Cost/Year	$0	$0	$0	$0	$14,400	$279,100
Salvage Value	$403,000	($380,000)	$233,400	(220,000)	$0	$0
Total Worth		$748,000		$416,000		$279,100

4.5.2 Environmental Evaluation

4.5.2.1 Cultural Resources

The Page, Carrier, Lister, and Plainfield Improvements project is in a previous construction area and no direct historical or archeological impact is expected. There is one historical site in the vicinity of the project, as summarized in Appendix 2.

4.5.2.2 The Natural Environment

The effects on the natural environment do not differ between construction alternatives. As summarized in Appendix 2, the only anticipated impact to the natural environment is a temporary decrease in air quality due to construction.

4.5.3 Mitigation

The impact on air quality will be controlled to the greatest extent possible by limiting construction to regular working hours during the week.

4.5.4 Implementability and Public Participation

Both construction alternatives would occur within the existing City of Grand Rapids public right-of-way dedicated for public utilities and roadways, except for the required replacement of lead services from the right-of-way limits to the houses. The City will cover the cost of the work on private property. No expense to the home-owner is anticipated for lead service replacement.

Appendix 3 provides detailed information on lead service line replacement public outreach and construction techniques.

4.5.5 Technical Considerations

4.5.5.1 No-Action

Dead end line O&M and water main age concerns are not addressed. Within 20 years, the lead services would need to be replaced to meet compliance requirements.

4.5.5.2 New 6- and 8-inch MP Water Main and Services

- Water main age addressed.
- Dead-end line O&M addressed.
- Lead service compliance requirements are met.

4.5.5.3 New Services and 8-inch Connection at Plainfield/Leonard Intersection

- Dead-end line O&M addressed in four of six dead-end lines.
- Lead service compliance requirements are met.

4.5.6 Residuals

This project will have no impact on residuals.

4.5.7 Industrial/Commercial/Institutional

The project area is fully developed; the majority of the properties served by the water main are residential or small businesses. Industrial/commercial/institutional usage does not require consideration in this case.

4.5.8 Growth Capacity

The purpose of the proposed project is to serve existing customers. The water main is not being installed for growth.

4.5.9 Contamination

There are several Part 201 Sites and LUSTs located near the project area. Depending on the size of the plume, the sites listed in Appendix 2 could impact the proposed project. Sites summarized in the appendix are on the east side of the Grand River; it is assumed contamination would not cross the Grand River, and therefore those sites are not in the list below. Map 1 shows the location of the project in relation to the contaminated sites.

4.6 Private Lead Service Line Replacement

4.6.1 Monetary Evaluation

The cost-effective analysis was completed for the construction alternative and for the No-Action alternative. The project budgetary cost summary for the alternative is presented in Table 20 below.

Table 20 – Estimated Project Cost Summary for New Private Side Services

Item	Initial Capital Cost	Design Life (years)	Salvage Value
New Copper Services	$3,088,000	50	$1,852,800
Contamination Allowance	$20,000	NA	NA
Subtotal: Estimated Construction Cost	$3,108,000		
Administration, Engineering, Contingency	$1,057,000		
Total: Estimated Project Budget	$4,165,000		

A present worth analysis was completed for the construction alternative and for the No-Action alternative, as summarized in Table 21. The No-Action alternative has no associated capital costs. Sunk costs are not included in the analysis.

Table 21 – 20-Year Present Worth Analysis: Private Lead Service Line Replacement

Alternatives	New Private Side Services		No-Action	
	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth
Capital Cost	$4,165,000	$4,165,000	$0	$0
O&M Cost/Year	$0	$0	$0	$0
Salvage Value	$1,852,800	($1,746,000)	$0	$0
Total Worth		$2,419,000		$0

4.6.2 Environmental Evaluation

4.6.2.1 Cultural Resources

The Private Lead Service Line Replacement project is in a previous construction area and no direct historical or archeological impact is expected. Several historical sites are in the vicinity of the project, as summarized in Appendix 2.

4.6.2.2 The Natural Environment

As summarized in Appendix 2, the only anticipated impact to the natural environment is a temporary decrease in air quality due to construction.

4.6.3 Mitigation

The impact on air quality will be controlled to the greatest extent possible by limiting construction to regular working hours during the week.

4.6.4 Implementability and Public Participation

The City will cover the cost of the work on private property. No expense to the home-owner is anticipated for lead service replacement. Appendix 3 provides detailed information on lead service line replacement public outreach and construction techniques.

4.6.5 Technical Considerations

4.6.5.1 No-Action

Within 20 years, the lead services would need to be replaced to meet compliance requirements.

4.6.5.2 New Private Side Services

Lead service compliance requirements are met.

4.6.6 Residuals

This project will have no impact on residuals.

4.6.7 Industrial/Commercial/Institutional

Not applicable.

4.6.8 Growth Capacity

Not applicable.

4.6.9 Contamination

There are several Part 201 Sites and LUSTs located near the project area. Depending on the size of the plume, the sites listed in Appendix 2 could impact the proposed project. Map 1 shows the location of the project in relation to the contaminated sites.

4.7 Giddings Avenue Water Main

4.7.1 Monetary Evaluation

The cost-effective analysis was completed for the two construction alternatives and for the No-Action alternative. The project budgetary cost summary for the two construction alternatives is presented in Table 22 and Table 23 below. The cost estimates include the restoration of curb, pavement, sidewalk, grass, and other items required to complete the improvements.

Table 22 – Estimated Project Cost Summary for New 8-inch HP Water Main and Services

Item	Initial Capital Cost	Design Life (years)	Salvage Value
New 8-inch HP Water Main	$710,000	50	$426,000
New Copper Services	$150,000	50	$90,000
City Street Reconstruction	$383,000	10	$0
Subtotal: Estimated Construction Cost	$1,243,000		
Administration, Engineering, Contingency	$424,000		
Total: Estimated Project Budget	$1,667,000		

Table 23 – Estimated Project Cost Summary for New Services

Item	Initial Capital Cost	Design Life (years)	Salvage Value
New Copper Services	$300,000		$180,000
Subtotal: Estimated Construction Cost	$300,000		
Administration, Engineering, Contingency	$102,000		
Total: Estimated Project Budget	$402,000		

A present worth analysis was completed for the two construction alternatives and for the No-Action alternative, as summarized in Table 24. The No-Action alternative has no associated capital costs. Sunk costs are not included in the analysis.

Table 24 – 20-Year Present Worth Analysis: Giddings Avenue Water Main

Alternatives	New 8-inch HP Water Main and Services		New Services		No-Action	
	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth
Capital Cost	$1,667,000	$1,667,000	$402,000	$402,000	$0	$0
O&M Cost/Year	$0	$0	$0	$0	$0	$0
Salvage Value	$516,000	($486,000)	$180,000	($170,000)	$0	$0
Total Worth		$1,181,000		$232,000		$0

4.7.2 Environmental Evaluation

4.7.2.1 Cultural Resources

The Giddings Avenue Water Main project is in a previous construction area and no direct historical or archeological impact is expected. There are no historical sites in the vicinity of the project.

4.7.2.2 The Natural Environment

The effects on the natural environment do not differ between construction alternatives. As summarized in Appendix 2, the only anticipated impact to the natural environment is a temporary decrease in air quality due to construction.

4.7.3 Mitigation

The impact on air quality will be controlled to the greatest extent possible by limiting construction to regular working hours during the week.

4.7.4 Implementability and Public Participation

Both construction alternatives would involve work within and outside of the existing City of Grand Rapids public right-of-way. The City will cover the cost of the work on private property. No expense to the home-owner is anticipated for lead service replacement.

Appendix 3 provides detailed information on lead service line replacement public outreach and construction techniques.

4.7.5 Technical Considerations

4.7.5.1 No-Action

Water main age is not addressed. Within 20 years, the lead services would need to be replaced to meet compliance requirements.

4.7.5.2 New 8-inch HP Water Main and Services

- Water main age addressed.
- Lead service compliance requirements are met.

4.7.5.3 New Services

- Lead service compliance requirements are met.
- Roadway patched for lead service replacements.

4.7.6 Residuals

This project will have no impact on residuals.

4.7.7 Industrial/Commercial/Institutional

The project area is fully developed; all properties served by the water main are residential. Industrial/commercial/institutional usage does not require consideration in this case.

4.7.8 Growth Capacity

The purpose of the proposed project is to serve existing customers. The water main is not being installed for growth.

4.7.9 Contamination

There are several Part 201 Sites and LUSTs located near the project area. Depending on the size of the plume, the sites listed in Appendix 2 could impact the proposed project. Map 1 shows the location of the project in relation to the contaminated sites.

4.8 Eleanor Street Water Main

4.8.1 Monetary Evaluation

The cost-effective analysis was completed for the two construction alternatives and for the No-Action alternative. The project budgetary cost summary for the two construction alternatives is presented in Table 25 and Table 26 below. The cost estimates include the restoration of curb, pavement, sidewalk, grass, and other items required to complete the improvements.

Table 25 – Estimated Project Cost Summary for New 6-inch HP and 8-inch MP Water Main and Services

Item	Initial Capital Cost	Design Life (years)	Salvage Value
New 6-inch HP and 8-inch MP Water Mains	$643,000	50	$385,800
New Copper Services	$163,000	50	$97,800
City Street Reconstruction	$346,000	10	$0
Contamination Allowance	$5,000	NA	NA
Subtotal: Estimated Construction Cost	$1,157,000		
Administration, Engineering, Contingency	$394,000		
Total: Estimated Project Budget	$1,551,000		

Table 26 – Estimated Project Cost Summary for Disconnect Pressure Districts and New Services

Item	Initial Capital Cost	Design Life (years)	Salvage Value
New 8-inch HP Water Main	$35,000	50	$21,000
New Copper Services	$325,000	50	$195,000
City Street Reconstruction	$19,000	10	$0
Contamination Allowance	$5,000	NA	NA
Subtotal: Estimated Construction Cost	$384,000		
Administration, Engineering, Contingency	$132,000		
Total: Estimated Project Budget	$516,000		

A present worth analysis was completed for the two construction alternatives and for the No-Action alternative, as summarized in Table 27. The No-Action alternative has no associated capital costs. Sunk costs are not included in the analysis.

Table 27 – 20-Year Present Worth Analysis: Eleanor Street Water Main

Alternatives	New 6-inch HP and 8-inch MP Water Main and Services		Disconnect Pressure Districts and New Services		No-Action	
	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth
Capital Cost	$1,551,000	$1,551,000	$516,000	$516,000	$0	$0
O&M Cost/Year	$0	$0	$0	$0	$12,000	232,600
Salvage Value	$483,600	($456,000)	$216,000	($204,000)	$0	$0
Total Worth		$1,095,000		$312,000		$0

4.8.2 Environmental Evaluation

4.8.2.1 Cultural Resources

The Eleanor Street Water Main project is in a previous construction area and no direct historical or archeological impact is expected. There are no historical sites in the vicinity of the project.

4.8.2.2 The Natural Environment

The effects on the natural environment do not differ between construction alternatives. As summarized in Appendix 2, the only anticipated impact to the natural environment is a temporary decrease in air quality due to construction.

4.8.3 Mitigation

The impact on air quality will be controlled to the greatest extent possible by limiting construction to regular working hours during the week.

4.8.4 Implementability and Public Participation

Both construction alternatives would occur within the existing City of Grand Rapids public right-of-way dedicated for public utilities and roadways, except for the required replacement of lead services from the right-of-way limits to the houses. The City will cover the cost of the work on private property. No expense to the home-owner is anticipated for lead service replacement.

Appendix 3 provides detailed information on lead service line replacement public outreach and construction techniques.

4.8.5 Technical Considerations

4.8.5.1 No-Action

Dead end line O&M and water main age concerns are not addressed. Within 20 years, the lead services would need to be replaced to meet compliance requirements.

4.8.5.2 New 6-inch HP and 8-inch MP Water Main and Services

- Water main age addressed.
- Dead-end line O&M addressed.
- Lead service compliance requirements are met.

4.8.5.3 Disconnect Pressure Districts and New Services

- Dead-end line O&M addressed.
- Lead service compliance requirements are met.
- Roadway patched for lead service replacements.

4.8.6 Residuals

This project will have no impact on residuals.

4.8.7 Industrial/Commercial/Institutional

The project area is fully developed; all properties served by the water main are residential. Industrial/commercial/institutional usage does not require consideration in this case.

4.8.8 Growth Capacity

The purpose of the proposed project is to serve existing customers. The water main is not being installed for growth.

4.8.9 Contamination

There are several LUSTs located near the project area. Depending on the size of the plume, the sites listed in Appendix 2 could impact the proposed project. Map 1 shows the location of the project in relation to the contaminated sites.

4.9 Plainfield Avenue Water Main

4.9.1 Monetary Evaluation

The cost-effective analysis was completed for the two construction alternatives and for the No-Action alternative. The project budgetary cost summary for the two construction alternatives is presented in Table 28 and

Table 29

below. The cost estimates include the restoration of curb, pavement, sidewalk, grass, and other items required to complete the improvements.

Table 28 – Estimated Project Cost Summary for New 8-inch HP and 12-inch MP Water Mains and Services

Item	Initial Capital Cost	Design Life (years)	Salvage Value
New 8-inch HP and 12-inch MP Water Mains	$1,700,000	50	$1,020,000
New Copper Services	$135,000	50	$81,000
City Street Reconstruction	$916,000	10	$0
Contamination Allowance	$10,000	NA	NA
Subtotal: Estimated Construction Cost	$2,761,000		
Administration, Engineering, Contingency	$940,000		
Total: Estimated Project Budget	$3,701,000		

Table 29 – Estimated Project Cost Summary for New 8-inch HP Water Main and Services

Item	Initial Capital Cost	Design Life (years)	Salvage Value
New 8-inch HP Water Main	$819,000	50	$491,400
New Copper Services	$135,000	50	$81,000
City Street Reconstruction	$441,000	10	$0
Contamination Allowance	$10,000	NA	NA
Subtotal: Estimated Construction Cost	$1,405,000		
Administration, Engineering, Contingency	$479,000		
Total: Estimated Project Budget	$1,884,000		

A present worth analysis was completed for the two construction alternatives and for the No-Action alternative, as summarized in Table 30. The No-Action alternative has no associated capital costs. Sunk costs are not included in the analysis.

Table 30 – 20-Year Present Worth Analysis: Plainfield Avenue Water Main

	New 8-inch HP and 12-inch MP Water Mains and Services		New 8-inch HP Water Main and Services		No-Action	
Alternatives	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth
Capital Cost	$3,701,000	$3,701,000	$1,884,000	$1,884,000	$0	$0
O&M Cost/Year	$0	$0	$0	$0	$24,000	$465,200
Salvage Value	$1,101,000	($1,037,000)	$572,400	($540,000)	$0	$0
Total Worth		$2,664,000		$1,344,000		$0

4.9.2 Environmental Evaluation

4.9.2.1 Cultural Resources

The Plainfield Avenue Water Main project is within the existing road right-of-way in a previous construction area; no direct historical or archeological impact is expected. One historical site is in the vicinity of the project, as summarized in Appendix 2.

4.9.2.2 The Natural Environment

The effects on the natural environment do not differ between construction alternatives. As summarized in Appendix 2, the only anticipated impact to the natural environment is a temporary decrease in air quality due to construction.

4.9.3 Mitigation

The impact on air quality will be controlled to the greatest extent possible by limiting construction to regular working hours during the week.

4.9.4 Implementability and Public Participation

Both construction alternatives would occur within the existing City of Grand Rapids public right-of-way dedicated to public utilities and roadways, except for the required replacement of lead services from the right-of-way limits to the houses. The City will cover the cost of the work on private property. No expense to the home-owner is anticipated for lead service replacement.

Appendix 3 provides detailed information on lead service line replacement public outreach and construction techniques.

4.9.5 Technical Considerations

4.9.5.1 No-Action

Dead end line O&M and water main age concerns are not addressed.

4.9.5.2 New 8-inch HP and 12-inch MP Water Mains and Services

- Water main age addressed.
- Dead-end line O&M addressed.

4.9.5.3 New 8-inch HP Water Main and Services

Dead-end line O&M addressed.

4.9.6 Residuals

This project will have no impact on residuals.

4.9.7 Industrial/Commercial/Institutional

The project area is fully developed; the majority of the properties served by the water main are residential or small businesses. Industrial/commercial/institutional usage does not require consideration in this case.

4.9.8 Growth Capacity

The purpose of the proposed project is to serve existing customers. The water main is not being installed for growth.

4.9.9 Contamination

There are several LUSTs located near the project area. Depending on the size of the plume, the sites listed in Appendix 2 could impact the proposed project. Map 1 shows the location of the project in relation to the contaminated sites.

4.10 Garfield Avenue Water Main

4.10.1 Monetary Evaluation

The cost-effective analysis was completed for the two construction alternatives and for the No-Action alternative. The project budgetary cost summary for the two construction alternatives is presented in Table 31 and Table 32 below. The cost estimates include the restoration of curb, pavement, sidewalk, grass, and other items required to complete the improvements.

Table 31 – Estimated Project Cost Summary for New 6- and 8-inch LP Water Main and Services

Item	Initial Capital Cost	Design Life (years)	Salvage Value
New 6- and 8-inch LP Water Main	$810,000	50	$486,000
New Copper Services	$163,000	50	$97,800
City Street Reconstruction	$437,000	10	0
Subtotal: Estimated Construction Cost	$1,410,000		
Administration, Engineering, Contingency	$481,000		
Total: Estimated Project Budget	$1,891,000		

Table 32 – Estimated Project Cost Summary for New Services

Item	Initial Capital Cost	Design Life (years)	Salvage Value
New Copper Services	$325,000	50	$195,000
Subtotal: Estimated Construction Cost	$325,000		
Administration, Engineering, Contingency	$111,000		
Total: Estimated Project Budget	$436,000		

A present worth analysis was completed for the two construction alternatives and for the No-Action alternative, as summarized in Table 33. The No-Action alternative has no associated capital costs. Sunk costs are not included in the analysis.

Table 33 – 20-Year Present Worth Analysis: Garfield Avenue Water Main

Alternatives	New 6- and 8-inch LP Water Main and Services		New Services		No-Action	
	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth
Capital Cost	$1,891,000	$1,891,000	$436,000	$436,000	$0	$0
O&M Cost/Year	$0	$0	$0	$0	$0	$0
Salvage Value	$583,800	($550,000)	$195,000	($184,000)	$0	$0
Total Worth		$1,341,000		$252,000		$0

4.10.2 Environmental Evaluation

4.10.2.1 Cultural Resources

The Garfield Avenue Water Main project is in a previous construction area and no direct historical or archeological impact is expected. There are no historical sites in the vicinity of the project.

4.10.2.2 The Natural Environment

The effects on the natural environment do not differ between construction alternatives. As summarized in Appendix 2, the only anticipated impact to the natural environment is a temporary decrease in air quality due to construction. Although the proposed project is in the 500 year flood boundary, no effect is anticipated.

4.10.3 Mitigation

The impact on air quality will be controlled to the greatest extent possible by limiting construction to regular working hours during the week.

4.10.4 Implementability and Public Participation

Both construction alternatives would occur within the existing City of Grand Rapids public right-of-way dedicated for public utilities and roadways, except for the required replacement of lead services from the right-of-way limits to the houses. The City will cover the cost of the work on private property. No expense to the home-owner is anticipated for lead service replacement.

Appendix 3 provides detailed information on lead service line replacement public outreach and construction techniques.

4.10.5 Technical Considerations

4.10.5.1 No-Action

Water main age concerns are not addressed. Within 20 years, the lead services would need to be replaced to meet compliance requirements.

4.10.5.2 New 6- and 8-inch LP Water Main and Services

- Water main age addressed.
- Lead service compliance requirements are met.

4.10.5.3 New Services

- Lead service compliance requirements are met.
- Roadway patched for lead service replacements.

4.10.6 Residuals

This project will have no impact on residuals.

4.10.7 Industrial/Commercial/Institutional

The project area is fully developed; the majority of the properties served by the water main are residential. Industrial/commercial/institutional usage does not require consideration in this case.

4.10.8 Growth Capacity

The purpose of the proposed project is to serve existing customers. The water main is not being installed for growth.

4.10.9 Contamination

There are several Part 201 Sites and LUSTs located near the project area. Depending on the size of the plume, the sites listed in Appendix 2 could impact the proposed project. Map 1 shows the location of the project in relation to the contaminated sites.

5.0 Selected Alternative

5.1 Selected Alternatives

5.1.1 LMFP Residuals Handling System Improvements

The selected alternative for the LMFP Residuals Handling Improvements is the *Separate Residuals Treatment.* This alternative will provide the necessary treatment of the solids generated at the LMFP while optimizing reliability, energy use, and space utilization. Separating the waste streams into dilute and concentrated streams will aid in the effectiveness of treatment. The treatment equipment will be sized for separate dilute and concentrated streams, which will help to optimize the size and energy use of the equipment. If all waste streams were combined, much larger equipment would be required to treat the large volume of wastewater. The dilute stream from the filter backwash cycles will initially be stored in an EQ tank, then pumped to redundant clarifiers. The clarified stream will be sent to the lagoons, while the concentrated solids will be combined with the concentrated sludge blowdown from the floc/sed basins and the pretreatment plate settlers. The combined, concentrated stream will be thickened using redundant gravity thickeners, then dewatered using mechanical dewatering equipment. The solids will be discharged to dumpsters, then sent to a landfill. The dilute, effluent filtrate from the clarifiers, gravity thickeners, and the dewatering equipment will be dechlorinated, then sent to the lagoons for final discharge. An overview of the selected alternative is detailed in Figure 5. Figure 6 shows a process flow schematic for the proposed improvements to the residuals handling process at the LMFP.

5.1.2 Franklin Street Pump Station Pump Replacement

The selected alternative for the Franklin Pump Replacement is *Pump Replacement with Four Separate VFDs*. This alternative optimizes the reliability of the station. The existing pumps P-1, P-2, P-3, and P-4 are single-speeds pumps and do not provide the operational flexibility that the Franklin Pump Station needs. Since the addition of VFDs to Pumps 5 through 8 in 2014, Pumps 1 through 4 are rarely used. Pump 2 has a synchronous motor and has not been operational for some time. Pump 4 was converted to a diesel-driven only engine as a part of the 2014 Franklin Street Pump Station upgrades and is rarely operated. The intent of the next series of upgrades to the station is to right-size Pumps 1 through 4 and provide VFDs on all pumps to allow the operators more flexibility in flow combinations. The no-action alternative was not selected because of the degraded performance of these pumps, which are needed to maintain reliability and operational flexibility at the pump station. Providing each pump with a VFD will allow for the greatest potential for operational flexibility. The speed of the pumps can be adjusted to meet the demands and fill the tanks in the East High and the East Grand Rapids Pressure Districts, without over pressurizing the systems. The adjustable speed will also allow for supply to the East Paris Reservoir from these high-pressure pumps. The selected alternative is detailed in Figure 7 and Figure 8.

5.1.3 College Avenue Water Main

The selected alternative for the College Avenue Water Main project is the installation of the new *8-inch MP and HP Water Mains and Services*. This alternative addresses the three major problems described in the summary of need, including water main age, dead-end line O&M, and lead service compliance. The selected alternative is detailed in Figure 9.

5.1.4 Straight Avenue SW and Wealthy Street SW Water Main

The selected alternative for the Straight Avenue SW and Wealthy Street SW Water Main project is the *New 12-inch LP Water Main and Services*. This alternative addresses the concern of water main age and lead service compliance while accounting for projected 20-year growth. The selected alternative is detailed in Figure 10.

5.1.5 Page, Carrier, Lister, and Plainfield Improvements

The selected alternative for the Page, Carrier, Lister, and Plainfield Improvements project is the installation of the new *6- and 8-inch MP Water Main and Services*. This alternative addresses the three major problems described in the summary of need, including water main age, dead-end line O&M, and lead service compliance. The selected alternative is detailed in Figure 11.

5.1.6 Private Lead Service Line Replacement

The selected alternative for the Private Lead Service Line Replacement project is the installation of the *New Private Side Services*. This alternative addresses lead service compliance. The selected alternative is detailed in Figure 12.

5.1.7 Giddings Avenue Water Main

The selected alternative for the Giddings Avenue Water Main project is the installation of the *New 8-inch HP Water Main and Services*. This alternative addresses the concern of water main age and lead service compliance. The selected alternative is detailed in Figure 13.

5.1.8 Eleanor Street Water Main

The selected alternative for the Eleanor Street Water Main project is the installation of the new *6-inch HP and 8-inch MP Water Mains and Services*. This alternative addresses the three major problems described in the summary of need, including water main age, dead-end line O&M, and lead service compliance. The selected alternative is detailed in Figure 14.

5.1.9 Plainfield Avenue Water Main

The selected alternative for the Plainfield Avenue Water Main project is the installation of the *New 8-inch HP and 12-inch MP Water Mains and Services*. This alternative addresses the concern of

water main age, dead-end line O&M, and lead service compliance. The selected alternative is detailed in Figure 15.

5.1.10 Garfield Avenue Water Main

The selected alternative for the Garfield Avenue Water Main project is the installation of the *New 6- and 8-inch LP Water Main and Services*. This alternative addresses the concern of water main age and lead service compliance. The selected alternative is detailed in Figure 16.

5.2 Design Parameters

5.2.1 LMFP Residuals Handling System Improvements

Parameters for the preliminary basis of design are as follows:

- Filter backwash water EQ tank capacity: 800,000 gallons (2 chambers; 400,000 gallons each).
- Filter backwash water pump (from filters to EQ tank) design flow: low rate: 5,500 gpm; high rate: 11,600 gpm.
- Filter backwash water pump (from EQ tank to clarifiers) design flow: 600 gpm.
- Clarifier volume: 2 clarifiers, 48-foot-diameter, 14-feet-deep, 190,000 gallons each. Detention time: 3.2 hr. Surface Overflow Rate: 800 gal/day/ft^2.
- Concentrated residual booster pumps (from floc/sed basins to gravity thickeners) design flow: 750 gpm.
- Gravity thickeners capacity: 3 thickeners (two duty, one standby). Solids loading design rate 750 dry lbs/hr, 700 gpm per unit hydraulic loading.
- Mechanical dewatering equipment capacity: 2 units (one duty, one standby). Solids loading design rate: 1,435 dry lbs/hr, 150 to 200 gpm hydraulic loading.
- New flow metering and bisulfite feed for dechlorination.

Figure 6 shows a process flow schematic for the proposed improvements to the residuals handling process at the LMFP.

5.2.2 Franklin Street Pump Station Pump Replacement

Parameters for the preliminary basis of design are as follows:

- New 800kW, 480V diesel generator.
- New 6-pulse low harmonic VFDs for pumps P-1, P-2, P-3, and P-4.
- New I/O at the station to control and monitor the new VFDs and monitors the new generators.
- New pumps for P-1, P-2, P-3, and P-4 as summarized in Table 34 below.

Table 34 – Franklin Pump Station Proposed Pumps

Pump	Design Flow (mgd)	Design Head (ft)	Pump CL Elev. (ft)	Motor (HP)	Motor Voltage	Notes
P-1	12.0	180	744.76	450	460	Variable Speed, 1800 rpm, HSC
P-2	12.0	180	744.76	450	460	Variable Speed, 1800 rpm, VSC
P-3	8.0	180	744.76	350	460	Variable Speed, 1800 rpm, VSC
P-4	8.0	180	744.76	350	460	Variable Speed, 1800 rpm, VSC

VSC – Vertical Split Case
HSC – Horizontal Split Case

Figure 8 shows a piping and instrumentation diagram for the proposed improvements at the Franklin Pump Station.

5.2.3 College Avenue Water Main

Table 35 – Design Parameters: College Avenue Water Main

Replace aged water main.	2,600 feet of 8-inch MP water main
Replace aged water main and eliminate dead-end mains.	1,550 feet of 8-inch HP water main
Lead Service Replacements.	78 properties
Dead-end water main lines eliminated.	3,300 feet, 80 homes

5.2.4 Straight Avenue SW and Wealthy Street SW Water Main

Table 36 – Design Parameters: Straight Avenue SW and Wealthy Street SW Water Main

Replace aged water main and upsize to account for 20-year planning projections.	1,450 feet of 12-inch LP water main
Lead Service Replacements.	23 homes

5.2.5 Page, Carrier, Lister, and Plainfield Improvements

Table 37 – Design Parameters: Page, Carrier, Lister, and Plainfield Improvements

Replace aged water main.	630 feet of 6-inch MP water main
Replace aged water main and eliminate dead-end mains.	200 feet of 6-inch MP water main 120 feet of 8-inch MP water main
Lead Service Replacements.	79 properties
Dead-end water main lines eliminated.	3,050 feet, 65 properties

5.2.6 Private Lead Service Line Replacement

Table 38 – Design Parameters: Private Lead Service Line Replacement

Lead Service Replacements.	1,235 homes

5.2.7 Giddings Avenue Water Main

Table 39 – Design Parameters: Giddings Avenue Water Main

Replace aged water main.	2,650 feet of 8-inch HP water main
Lead Service Replacements.	60 homes

5.2.8 Eleanor Street Water Main

Table 40 – Design Parameters: Eleanor Street Water Main

Replace aged water main.	1,400 feet of 8-inch MP water main
Replace aged water main and eliminate dead-end mains.	1,000 feet of 6-inch HP water main
Lead Service Replacements.	65 homes
Dead-end water main lines eliminated.	3,600 feet, 102 homes

5.2.9 Plainfield Avenue Water Main

Table 41 – Design Parameters: Plainfield Avenue Water Main

Replace aged water main.	3,350 feet of 12-inch MP water main
Replace aged water main and eliminate dead-end mains.	3,000 feet of 8-inch HP water main
Lead Service Replacements.	54 homes
Dead-end water main lines eliminated.	8,300 feet, 230 homes

5.2.10 Garfield Avenue Water Main

Table 42 – Design Parameters: Garfield Avenue Water Main

Replace aged water main.	700 feet of 6-inch LP water main 300 feet of 8-inch LP water main
Lead Service Replacements.	65 homes

5.3 Maps

A list of figures associated with the selected alternatives is summarized below.

Water Distribution System	Figure 2
Water System Recommended Improvements	Figure 4
LMFP Residuals Handling Improvements	Figure 5
Franklin Street Pump Station Pump Replacement	Figure 7
College Avenue Water Main	Figure 9
Straight Avenue SW and Wealthy Street SW Water Main	Figure 10
Page, Carrier, Lister, and Plainfield Improvements	Figure 11
Private Lead service Line Replacement	Figure 12
Giddings Avenue Water Main	Figure 13
Eleanor Street Water Main	Figure 14
Plainfield Avenue Water Main	Figure 15
Garfield Avenue Water Main	Figure 16

5.4 Schedule for Design and Construction

The project schedules for each project are detailed in program evaluation and review tables (PERT) as shown in Appendix 4.

5.5 Cost Estimate

This section summarizes the selected alternatives and their estimated project costs including engineering design, administrative and legal costs, and construction. Engineering costs include preparation of the project plan, route alternative analyses, design, and construction and inspection

services. The cost estimates presented in this report reflect January 2020 costs. These cost estimates were prepared to determine approximate project costs to aid the City in its planning and budgeting process. There are a number of factors that could cause the actual project costs to deviate from these estimates. These include the competitive bidding climate at the time that the construction bids are received, inflation, and additions to or changes in the scope of the project that may occur during the design process. The total estimated capital cost for all ten projects is summarized in Table 43 below.

Table 43 – Summary of Estimated Capital Costs

No.	Project	Estimated Project Start Date (Bid Date)	Total Estimated Project Cost
1.	LMFP Residuals Handling Improvements	Mar-22	$ 18,380,000
2.	Franklin Street Pump Station Pump Replacement	Jan-22	$ 3,970,000
3.	College Avenue Water Main	Dec-21	$ 2,626,000
4.	Straight Avenue SW and Wealthy Street SW Water Main	Dec-21	$ 1,271,000
5.	Page, Carrier, Lister, and Plainfield Improvements	Dec-22	$ 1,128,000
6.	Private Lead Service Line Replacement (Year 1)	May-21	$ 1,700,000
	Private Lead Service Line Replacement (Year 2)	--	$ 1,700,000
	Private Lead Service Line Replacement (Year 3)	--	$ 765,000
7.	Giddings Avenue Water Main	Dec-22	$ 1,667,000
8.	Eleanor Street Water Main	Dec-22	$ 1,551,000
9.	Plainfield Avenue Water Main	Dec-22	$ 3,701,000
10.	Garfield Avenue Water Main	Dec-21	$ 1,891,000
	Total		$ 40,677,000

Table 44 below breaks down the cost between estimated capital cost, contingencies, and engineering/administration/and legal fees.

Table 44 – Breakdown of Estimated Project Costs

Category	Cost
Estimated Capital Cost	$ 30,234,000
Project Contingency	$ 3,625,000
Engineering, Administration, Legal	$ 6,818,000
Total	$ 40,677,000

5.6 User Costs

The project at the LMFP is considered an integrated cost because it benefits all users. The cost is distributed proportionately among users through a commodity charge based on the current average daily water demand.

The cost distribution of the other projects is as follows.

- The Franklin Street Pump Station Pump Replacement project is zonegated as follows:
  - City of Grand Rapids: 42%
  - Grand Rapids Township: 1%
  - East Grand Rapids: 10%
  - Cascade Township: 16%
  - Kentwood: 31%
- All other distribution system projects are fully allocated (100%) to the City of Grand Rapids.

The costs are allocated based on current (2020) ADD as summarized in Table 45 below. The DWRF Project Plan does not allow potential revenue from future growth or development to be considered in the calculation of user costs.

Table 45 – User Costs Based on Current (2020) ADD

	ADD	
Customer Community	2020	Percent of Total
City of Grand Rapids	20.552	52.98%
Kentwood	4.488	11.57%
Walker	3.061	7.89%
East Grand Rapids	1.265	3.26%
Cascade Township	2.389	6.16%
Grand Rapids Township	1.718	4.43%
Ada Township	1.393	3.59%
Tallmadge Township	0.123	0.32%
Allendale Township	2.010	5.18%
Coopersville	1.560	4.02%
Ottawa County	0.230	0.59%
Total	38.789	100%

The estimated user cost for the project at the LMFP can be allocated to each community based on their percentage of the total water used. The other nine projects can be allocated based on the percentages provided above. The estimated total cost to each community is summarized in Table 46 below.

Table 46 – Estimated Total User Cost per Community

Customer Community	Cost Allocation	
	Cost	Percent of Total
City of Grand Rapids	$29,543,216	72.63%
Kentwood	$3,458,689	8.50%
Walker	$1,450,442	3.57%
East Grand Rapids	$1,029,115	2.53%
Cascade Township	$1,819,537	4.47%
Grand Rapids Township	$857,037	2.11%
Ada Township	$660,067	1.62%
Tallmadge Township	$58,283	0.14%
Allendale Township	$952,430	2.34%
Coopersville	$739,199	1.82%
Ottawa County	$108,985	0.27%
Total	$40,677,000	100%

The cost per 100 cubic feet of water to finance the projects over a 20-year period at an interest rate of 2% (obtained from EGLE as the DWRF interest rate) was calculated for each community and is summarized in Table 47. For a family of four consuming 100 gallons per day per person (400 gpd total), the monthly cost to finance the projects is presented in column three of Table 47.

Table 47 – Estimated User Cost to Finance the Projects

Customer Community	Cost per 100 cubic feet	Estimated Monthly Cost @ 400 gpd
City of Grand Rapids	$0.18	$2.91
Kentwood	$0.10	$1.56
Walker	$0.06	$0.96
East Grand Rapids	$0.10	$1.65
Cascade Township	$0.09	$1.54
Grand Rapids Township	$0.06	$1.01
Ada Township	$0.06	$0.96
Tallmadge Township	$0.06	$0.96
Allendale Township	$0.06	$0.96
Coopersville	$0.06	$0.96
Ottawa County	$0.06	$0.96

The current average monthly cost for a family of four is presented in Table 48 below along with the adjusted monthly cost once all ten of the proposed projects have been financed. Costs have been allocated proportionately based on the current system and current users. As the system is improved or demands change the City periodically reallocates the zonegated capital improvements.

Table 48 – Current and Adjusted Typical Monthly Cost for Family of Four

Customer Community	Typical Monthly Cost for Family of Four	
	Current Monthly Cost	Adjusted Monthly Cost
City of Grand Rapids	$44.58	$47.49
Kentwood	$42.11	$43.67
Walker	$42.26	$43.22
East Grand Rapids	$21.67	$23.32
Cascade Township	$62.84	$64.38
Grand Rapids Township	$49.46	$50.47
Ada Township	$38.44	$39.40
Tallmadge Township	$52.92	$53.88
Allendale Township	$50.41	$51.37
Coopersville	$54.91	$55.87
Ottawa County (max)	$54.58	$55.54

5.7 Disadvantaged Community

The Disadvantaged Community qualification is determined for each loan that is applied for by the community. For some loans, the community may qualify as Disadvantaged, while for other loans it may not, depending on the projects included in the specific loan and the users that the projects impact. As described in Section 5.6, eight of the ten projects in this DWRF Project Plant are fully allocated to the City of Grand Rapids, so the cost of these projects only impacts users within the City. The LMFP Residuals Handling project and the Franklin Pump Station project, however, are allocated across the entire service area and impact users of multiple customer communities.

The exact breakdown of the projects within separate loans has yet to be determined by the City. For the purpose of this evaluation, it was assumed that projects with bid dates that fall within the same quarter of the same DWRF fiscal year will be under one loan. This results in four separate loans, as summarized in

Table 49

. As shown, the LMFP project and the Franklin Pump Station project fall within the same quarter under Loan #2. This evaluation serves as an example of how the projects could be broken out into separate loans, but it should be noted that this breakdown may change if the City decides to take a different approach to project implementation.

Table 49 – Example of Project Breakdown

DWRF Fiscal Year	Project Name	Project Cost	Anticipated Start*	Anticipated Completion*	Quarter			
					1st	2nd	3rd	4th
FY-21	Private Lead Service Line Replacement	$4,165,000	May-21	Dec-23			x	
	Loan #1	***$4,165,000***						
FY-22	Franklin Pump Station Pump Replacement	$4,297,000	Jan-22	Sep-23		x		
	LMFP Residuals Handling Improvements	$18,380,000	Mar-22	May-24		x		
	Loan #2	***$22,677,000***						
	College Avenue Water Main	$2,626,000	Dec-21	Oct-22	x			
	Straight Avenue SW and Wealthy Street SW Water Main	$1,271,000	Dec-21	Oct-22	x			
	Valley Avenue and Garfield Avenue Water Main	$1,891,000	Dec-21	Sep-22	x			
	Loan #3	***$5,788,000***						
FY-23	Page, Carrier, Lister, and Plainfield Improvements	$1,128,000	Dec-22	Sep-23	x			
	Giddings Avenue Water Main	$1,667,000	Dec-22	Oct-23	x			
	Eleanor Street Water Main	$1,551,000	Dec-22	Sep-23	x			
	Plainfield Avenue Water Main	$3,701,000	Dec-22	Oct-23	x			
	Loan #4	***$8,047,000***						

*Anticipated start begins with bidding of the project, and anticipated completion ends with completion of construction
Note, the breakdown of projects shown in this table serves as an example of how the projects could be broken out into separate loans, however this is not the final determination of project breakdown and the actual breakdown may differ from what is shown.

The first step in determining whether a community qualifies as Disadvantaged for a particular loan is to determine the median annual household income (MAHI) for the area served by the projects under that loan. The MAHI must not exceed 120% of the Michigan MAHI. The MAHIs for each community were obtained from the 2018 U.S. Census, then escalated based on the Consumer Price Index (CPI) from the Bureau of Labor Statistics to reflect 2019 projections; this was done so that the data corresponds with the 2019 user data obtained from the City's water rate study.

For Loans #1, #3, and #4, the MAHI for Grand Rapids was compared to the Michigan MAHI. For Loan #2, the weighted average MAHI for the entire service area was determined based on the portion of the project costs that are allocated to each community. Table 50 summarizes the results of this evaluation. As shown, all four loans meet the criteria by having MAHIs that are below 120% of the Michigan MAHI.

Table 50 – Weighted Average Median Annual Household Income per Loan

		Loan #1			Loan #2			Loan #3			Loan #4		
	2019 MAHI*	Total Cost of Projects	% Allocation of Projects	Weighted Average MAHI	Total Cost of Projects	% Allocation of Projects	Weighted Average MAHI	Total Cost of Projects	% Allocation of Projects	Weighted Average MAHI	Total Cost of Projects	% Allocation of Projects	Weighted Average MAHI
State of Michigan	*$55,741*												
City of Grand Rapids	$47,863	$4,165,000	100%	$47,863	$11,543,216	51%	$24,363	$5,788,000	100%	$47,863	$8,047,000	100%	$47,863
City of Walker	$63,369	$0	0%	$0	$1,450,442	6%	$4,053	$0	0%	$0	$0	0%	$0
City of Kentwood	$53,284	$0	0%	$0	$3,458,689	15%	$8,127	$0	0%	$0	$0	0%	$0
Cascade Township	$108,747	$0	0%	$0	$1,819,537	8%	$8,726	$0	0%	$0	$0	0%	$0
Grand Rapids Township	$104,074	$0	0%	$0	$857,037	4%	$3,933	$0	0%	$0	$0	0%	$0
Allendale	$52,873	$0	0%	$0	$952,430	4%	$2,221	$0	0%	$0	$0	0%	$0
Coopersville	$54,287	$0	0%	$0	$739,199	3%	$1,770	$0	0%	$0	$0	0%	$0
Ottawa County	$68,454	$0	0%	$0	$108,985	0%	$329	$0	0%	$0	$0	0%	$0
Tallmadge Township	$71,046	$0	0%	$0	$58,283	0%	$183	$0	0%	$0	$0	0%	$0
East Grand Rapids	$135,941	$0	0%	$0	$1,029,115	5%	$6,169	$0	0%	$0	$0	0%	$0
Ada Township	$127,266	$0	0%	$0	$660,067	3%	$3,704	$0	0%	$0	$0	0%	$0
Totals		**$4,165,000**	**100%**	**$47,863**	**$22,677,000**	**100%**	**$63,578**	**$5,788,000**	**100%**	**$47,863**	**$8,047,000**	**100%**	**$47,863**
Percent of Michigan MAHI				**86%**			**114%**			**86%**			**86%**
Status				**Criteria met**			**Criteria met**			**Criteria met**			**Criteria met**

*Updated from 2018 U.S. Census Bureau Data using Consumer Price Index (CPI)

The next step in determining whether a community qualifies as Disadvantaged for a particular loan is to demonstrate that they meet either the Poverty Criteria or the Affordability Criteria.

Poverty Criteria

The poverty criteria would be met by having a MAHI less than the federal poverty guidelines for a family of four and by having more than 50% of the area served by the proposed projects in a poverty area. The 2020 federal poverty guideline for a family of four is a MAHI of $26,200. All entities exceed this MAHI; therefore, this criterion is not met. In addition, the service area does not have more than 50% of the area in a poverty area.

Affordability Criteria

The affordability criteria would be met by demonstrating that the area MAHI is less than the Michigan MAHI and annual user costs are greater than 1.0% of the area MAHI, or by demonstrating the area MAHI is greater than the Michigan MAHI (up to 120%) and the annual user costs will exceed 3% of the area MAHI.

As shown in Table 50, loans that only affect users in Grand Rapids (Loans #1, #3, and #4) have a MAHI less than the Michigan MAHI. The user cost for a family of four consuming 400 gallons per day was compared to 1.0% of the Grand Rapids MAHI. For Loan #2, the MAHI is greater than the Michigan MAHI, so the user cost was compared to 3.0% of the weighted average MAHI. For all four loans, the user cost was calculated to be approximately $47 per month. The user costs include the current (2019) user rates and the additional user costs resulting from the projects, as described in Section 5.6 of this report.

Table 51 summarizes the Affordability Criteria evaluation, comparing the results with the calculated user cost of $47 per month. Based on this analysis, the City may qualify for Disadvantaged Community status for Loans #1, #3, and #4.

Table 51 – Affordability Criteria Weighted Average User Cost Evaluation

	Loan #1			***Loan #2***			***Loan #3***			***Loan #4***		
	1.0% of MAHI Annual	1.0% of MAHI Monthly	Status	3.0% of MAHI Annual	3.0% of MAHI Monthly	Status	1.0% of MAHI Annual	1.0% of MAHI Monthly	Status	1.0% of MAHI Annual	1.0% of MAHI Monthly	Status
Weighted Average	$479	$39.89	**Qualifies**	$1,907	$158.94	**Criteria NOT met**	$479	$39.89	**Qualifies**	$479	$39.89	**Qualifies**

Following the analysis described above, the City may meet the Disadvantaged Community qualifications based on the Affordability Criteria for projects that impact users in Grand Rapids only. Loans that include projects that share costs with other customer communities likely will not meet the Disadvantaged qualification. A *Disadvantaged Community Status Determination Worksheet* must be submitted to EGLE for every loan that may qualify as Disadvantaged. EGLE makes the final determination of whether a community meets the Disadvantaged Community qualifications and determines the benefits that will be awarded. The worksheet for Loan #1 will be included with the final Project Plan, and subsequent worksheets will be submitted to EGLE with future loans applications.

5.8 Ability to Implement the Selected Alternative

The LMFP and water distribution system are owned and operated by the City of Grand Rapids. The City has water service agreements with all of the retail and wholesale customers. No amendments to the agreements will be necessary for the DWRF loan. All financial and loan-related work will be handled by the City of Grand Rapids Financial Department.

6.0 Environmental Evaluation

6.1 Historical/Archaeological/Tribal Resources

In order to identify sites of historical and cultural significance, the City of Grand Rapids *Historic Districts and Landmark Map*, the National Register of Historic Places, the National Archives, and the State's Register of Historic Sites were reviewed. Several historical sites were identified in the vicinity of the proposed projects as discussed in Appendix 2. No direct historical or archeological impacts are expected.

An Application for a Section 106 Review will be filed with the Michigan State Historical Preservation Office (SHPO) that describes the areas affected by the proposed upgrades and includes pictures of structures greater than 50 years old within the limits of the proposed projects. The SHPO will review the proposed upgrades, and if necessary, will request modifications that are consistent with their requirements. Tribal Historic Preservation Officers (THPOs) will also be contacted for an opportunity to comment on the proposed projects.

6.2 Water Quality

The proposed construction projects will provide continued high-quality water. Modifications to pumps will optimize existing systems, increase reliability, and provide adequate pressure throughout the distribution system. Water main projects will replace aging infrastructure and address water quality concerns. Updates at the LMFP will provide the necessary treatment of the solids generated at the LMFP while optimizing reliability, energy use, and space utilization.

The proposed projects will not affect surface water or groundwater quality or quantity.

6.3 Land/Water Interface

Map 3 depicts the location of wetlands with respect to the proposed project. None of the proposed projects occur within a wetland. The Straight Avenue SW and Wealthy Street SW Water Main projects are in the vicinity of a small swath of wetland along the Grand River. No negative impacts to the wetlands are expected as a result of the proposed projects.

The extent of the 500-year flood boundary as defined by the National Flood Insurance Program consists primarily of the areas immediately adjacent to the Grand River and its tributaries. Map 4 presents both the 100-year and 500-year floodplains. The Straight Avenue SW and Wealthy Street SW Water Main project and the Garfield Avenue Water Main project are both within the limits of the 500-year flood boundary. No negative impacts on the flood boundaries are expected as a result of the proposed project.

6.4 Endangered Species

The City of Grand Rapids and the surrounding service area are in the County of Kent, while the LMFP is located in Ottawa County. The federally listed endangered and threatened species for the two counties are detailed in Table 52 below. Endangered or threatened species are defined as those species that are or could become endangered or threatened and, therefore, are protected under the Endangered Species Act. The objective of the act is to preserve and restore species threatened with extinction. The Michigan Natural Features Inventory has additional listings of fauna and flora with a state status of endangered, threatened, or special concern.

Table 52 – Federally Threatened and Endangered Species

County	Name	Status
Kent	Snuffbox Mussel	Endangered
	Karner Blue Butterfly	Endangered
	Indiana Bat	Endangered
	Northern Long-Eared Bat	Threatened
	Eastern Massasauga	Threatened
Ottawa	Piping Plover	Endangered
	Red Knot	Threatened
	Snuffbox Mussel	Endangered
	Pitcher's Thistle	Threatened
	Indiana Bat	Endangered
	Northern Long-Eared Bat	Threatened
	Eastern Massasauga	Threatened

The probability of threatened, endangered, or special concern species can be seen on Map 6. All the projects occur in areas of low probability. Because the projects will occur in urban areas where no suitable wildlife habitat is present or construction work will be limited to existing structures, contact with the Michigan Natural Features Inventory (MNFI) and United States Fish and Wildlife Service (USFWS) is not required.

6.5 Agricultural Land

The location of prime farmland with respect to the proposed projects is depicted in Map 5. The Straight Avenue SW and Wealthy Street SW Water Main projects are located near a swath of farmland of local importance along the Grand River; the proposed activities will occur within the road right-of-way and will not negatively impact existing land use.

6.6 Social/Economic Impact

Upgrading the LMFP, pumping, and distribution system will result in direct cultural and social benefits. Public health and safety will benefit from the increased quality and reliability the proposed projects will create.

The construction phase of the projects will create jobs and contribute favorably to the local economy.

6.7 Construction/Operational Impact

6.7.1 LMFP Residuals Handling Improvements

The LMFP Residuals Handling Improvements project will not greatly disrupt the area of construction. The area surrounding the LMFP is not heavily trafficked or populated, so construction activity will have minimal disruption. The LMFP property has adequate space available for new structures without significant modifications to the environment.

6.7.2 Franklin Pump Station Pump Replacement

The Franklin Pump Station is located at a public park in a residential area, so construction activity may be disruptive due to noise and construction traffic. However, all modifications to the station will occur inside the building, which will minimize the effect of noise. In addition, there is a parking lot outside the station where construction equipment can be stationed without disrupting traffic.

6.7.3 College Avenue Water Main

Water main construction of this nature is routine for existing residential streets in the City of Grand Rapids. For College Avenue, the new water mains would be installed under the pavement just east of the westerly curb line. Removal and replacement of the westerly curb line and approximately 15 feet of pavement will be required. Though College Avenue is tree-lined, no tree removals are anticipated. All grass parkways will be restored in kind. Additionally, the City plans to reconstruct the entire street beyond the water main limits and upgrade storm and sanitary sewers where required.

Roads to be closed, including College Avenue, are used predominately for local traffic. No adverse impacts to major street traffic patterns are anticipated. Construction for projects of this type are generally limited to the hours 7:00 am to 7:00 pm Monday through Friday and 7:00 am to 1:00 pm on Saturday. Vehicular and pedestrian access to all properties will be maintained throughout construction.

6.7.4 Straight Avenue SW and Wealthy Street SW Water Main

Water main construction of this nature is routine for existing residential streets in the City of Grand Rapids. In Straight Avenue, the new water main would be installed under the pavement just east of the westerly curb line. Removal and replacement of the westerly curb line and approximately 10 feet of pavement will be required. Additionally, a bore and jack under a railroad track will be required. In Wealthy Street, the new water main would be installed either in the south parkway or under the pavement just north of the southerly curb line. If the main is placed under the pavement, removal and replacement of the southerly curb line and approximately 10 feet of pavement will be required. Though both streets are tree-lined, no tree removal is anticipated. All grass parkways will be restored in kind.

Wealthy Street is a major truck route and would remain open to two-way traffic during construction. Straight Avenue is used predominately for local traffic and would be closed to through traffic. No adverse impact on major street traffic patterns is anticipated. Construction hours for projects of this type are generally limited to the 7:00 am to 7:00 pm Monday through Friday, and 7:00 am to 1:00 pm on Saturday. Vehicular and pedestrian access to all properties will be maintained throughout construction.

6.7.5 Page, Carrier, Lister, and Plainfield Improvements

Water main construction of this nature is routine for existing residential streets in the City of Grand Rapids. No tree removal is anticipated. All grass parkways will be restored in kind.

The work would be phased to close small portions of Plainfield Avenue to through traffic. No major impacts on street traffic patterns are anticipated. Construction hours for projects of this type are generally limited to the 7:00 am to 7:00 pm Monday through Friday and 7:00 am to 1:00 pm Saturday. Vehicular and pedestrian access to all properties will be maintained throughout construction.

6.7.6 Private Lead Service Line Replacement

Nearly all the work would take place behind the curb lines. Though most of the streets are tree-lined, no tree removal is anticipated. All grass parkways will be restored in kind.

No adverse impacts on major street traffic patterns are anticipated. Construction for projects of this type are generally limited to the hours 7:00 am to 7:00 pm Monday through Friday, and 7:00 am to 1:00 pm on Saturday. Vehicular and pedestrian access to all properties will be maintained throughout construction.

6.7.7 Giddings Avenue Water Main

Water main construction of this nature is routine for existing residential streets in the City of Grand Rapids. For Giddings Avenue, the new water main would be installed under the pavement just east of the westerly curb line. Removal and replacement of the westerly curb line and approximately 10 feet of pavement will be required. Though the street is tree-lined, no tree removal is anticipated. All grass parkways will be restored in kind.

Roads to be closed, including Giddings Street, are used predominately for local traffic. No adverse impacts on major street traffic patterns are anticipated. Construction hours for projects of this type are generally limited to the 7:00 am to 7:00 pm Monday through Friday, and 7:00 am to 1:00 pm on Saturday. Vehicular and pedestrian access to all properties will be maintained throughout construction.

6.7.8 Eleanor Street Water Main

Water main construction of this nature is routine for existing residential streets in the City of Grand Rapids. In Eleanor Street, the new water main would be installed under the pavement just south of the northerly curb line. Removal and replacement of the northerly curb line and approximately 10 feet of pavement will be required. Though Eleanor Street is tree-lined no tree removal is anticipated. All grass parkways will be restored in kind.

Roads to be closed, including Eleanor Street, are used predominately for local traffic. No adverse impacts to major street traffic patterns are anticipated. Construction for projects of this type are generally limited to the hours 7:00 am to 7:00 pm Monday through Friday, and 7:00 am to 1:00 pm on Saturday. Vehicular and pedestrian access to all properties will be maintained throughout construction.

6.7.9 Plainfield Avenue Water Main

Water main construction of this nature is routine for existing residential streets in the City of Grand Rapids. In this case, the new water mains would be installed under the pavement just east of the westerly curb line. Removal and replacement of the westerly curb line and approximately 20 feet width of pavement will be required. Additionally, the entire street width would be resurfaced beyond the water main trench limits. No tree removal is anticipated. All grass parkways will be restored in kind.

The work would be phased to close small portions of Plainfield Avenue to through traffic. No major impacts on street traffic patterns are anticipated. Construction hours for projects of this type are generally limited to the 7:00 am to 7:00 pm Monday through Friday, and 7:00 am to 1:00 pm on Saturday. Vehicular and pedestrian access to all properties will be maintained throughout construction.

6.7.10 Garfield Avenue Water Main

Water main construction of this nature is routine for existing residential streets in the City of Grand Rapids. For Garfield Avenue, the new water main would be installed under the pavement just east of the westerly curb line. Removal and replacement of the westerly curb line and approximately 10 feet of pavement will be required. For both Veto and California Streets, the new water mains would be installed under the pavement just south of the northerly curb line. Removal and replacement of the northerly curb line and approximately 10 feet of pavement will be required. Though all three streets are tree-lined, no tree removal is anticipated. All grass parkways will be restored in kind.

Roads to be closed, including Garfield Avenue, are used predominately for local traffic. No adverse impacts on major street traffic patterns are anticipated. Construction hours for projects of this type are generally limited to the 7:00 am to 7:00 pm Monday through Friday and 7:00 am

to 1:00 pm on Saturday. Vehicular and pedestrian access to all properties will be maintained throughout construction.

6.8 Indirect Impacts

6.8.1 Changes in Development

The City of Grand Rapids and the City of Kentwood have limited undeveloped land. Other communities within the service area have the potential for further development. The proposed alternatives enhance the existing water distribution and treatment system. The Straight Avenue SW and Wealthy Street SW Water Main project include the upsizing of the existing water main to support 20-year planning projections; this upsizing will complete a higher capacity loop to service potential redevelopment of the area from residential to industrial/commercial/institutional use.

6.8.2 Changes in Land Use

With limited undeveloped land in Grand Rapids, significant changes in land use in the City are not expected as an indirect result of the proposed improvements. Future changes in land use in the region are most likely to occur in the townships.

6.8.3 Changes in Air or Water Quality

Kent County has air-quality monitoring sensors as part of the Michigan Air Sampling Network. The State of Michigan is broken down into smaller areas or core based on statistical areas (CBSAs). The Air Quality Index (AQI) was developed by the USEPA to provide a simple uniform way to report daily air pollution. The AQI is an approximate indicator of overall air quality. The USEPA provides data on the number of days on which measurements were reported to their database. The quality of air on those days is rated as good, moderate, unhealthy for sensitive groups, and unhealthy. The pollutants that were most frequently measured are also provided by the USEPA expressed as the number of days.

With water system improvements, the potential exists for new development in the area and indirect air pollutant loadings from additional automobile traffic and recreational activities. Any new development will be selective because of the limited undeveloped property in the City, the long-term ownership of existing property, and the limited capacity of the LMFP.

6.8.4 Changes to Natural Setting or Sensitive Ecosystems

With limited undeveloped land in Grand Rapids, a significant ecosystem or natural setting changes are not expected as an indirect result of the proposed projects. Changes to the natural settings in the townships could result from planned growth; the effect on sensitive ecosystems will be controlled by the assessment of environmental impacts and the permitting process.

6.8.5 Changes to Aesthetic Aspects of the Community

The indirect effect of a more reliable LMFP and distribution system will be the ability to support economic growth and continue the social and cultural traditions of the City and the region.

6.8.6 Resource Consumption

Resource consumption in the form of building materials and energy will occur with the planned growth in the townships.

7.0 Mitigation Measures

Measures that will be taken to avoid, eliminate, or mitigate potential short-term environmental impacts include the following:

- Traffic: use of designated traffic routes for construction traffic, as well as flagmen, warning signs, barricades, and cones.
- Air emissions: use of calcium chloride or water for dust control and proper maintenance on heavy equipment to reduce exhaust emissions.
- Noise control: use designated daytime work hours, use mufflers on all equipment, and minimize work on weekends and/or holidays.
- Soil erosion and sedimentation control: use riprap, hay bales, erosion control fence, silt fence, etc.
- Restoration: use topsoil, seed, sod, mulch, gravel, and pavement.

Measures that will be taken to avoid, eliminate, or mitigate potential long-term environmental impacts include the following:

- Soils disposal and contaminated soils: if construction occurs in floodplains or near a lake or stream, a U.S. Army Corps of Engineers-EGLE Joint Permit will be filed that indicates quantities of soils taken off-site or used onsite as fill, new fill materials utilized onsite, buffer zones from ecologically sensitive areas, and measures that will be taken to stabilize embankments.
- A Soil Erosion Plan for the construction of the selected alternative will be filed with the local Soil Erosion and Sedimentation Control Agency (Kent County Drain Commissioner). The plan will also be reviewed by the EGLE Land and Water Management Division. The plan will summarize the quantity of soils that will be excavated, locations where soil will be stored, the destination of soils (onsite or off-site) and measures that will be taken (silt fence, sod, etc.) to minimize erosion.

Measures that will be taken to avoid, eliminate, or mitigate potential indirect environmental impacts include the following:

- Planning: the West Michigan Planning Commission recommends agricultural zoning, tax relief mechanisms, purchase of development rights, and other methods to preserve agricultural land in Kent County. The City of Grand Rapids Master Plan outlines the facilities improvements consistent with development. The proposed improvements to the LMFP would not create additional indirect environmental impacts.

8.0 Public Participation

8.1 Public Hearing Advertisement

The public hearing will be advertised in the local newspapers, the Grand Rapids Press and the Grand Haven Tribune, on March 16, 2020. The advertisements will list the public hearing date, describe the availability of the report for viewing, and briefly describe the proposed projects and estimated costs. Copies of the Project Plan will be available at Grand Rapids Engineer's Office, Walker City Hall, Cascade Township Offices, Kentwood City Hall, Grand Rapids Township Offices, Tallmadge Township Offices, East Grand Rapids City Hall, Ada Township Offices, and Ottawa County Road Commission.

The advertisements will be included in Appendix 6.

8.2 Formal Public Hearing

A formal public hearing will be held on April 16 at 6:00 p.m. at the City Commission Chambers at Grand Rapids City Hall. The following items will be discussed during the public hearing, followed by a question and comment period.

- A description of the drinking water quality needs and problems to be addressed by the proposed project and the principal alternatives that were considered.
- A description of the recommended alternative, including its capital costs and a cost breakdown by project components.
- A discussion of project financing and costs to users, including the proposed method of project financing and estimated monthly debt retirement; the proposed annual, quarterly, or monthly charge to the typical residential customer; and any special fees that will be assessed.
- A description of the anticipated social and environmental impacts associated with the recommended alternative and the measures that will be taken to mitigate adverse impacts.

8.3 Public Hearing Transcript or Recording

A digital transcriptionist will be present to produce a digital recording of the meeting. The video recording will accompany the final submittal of the Project Plan.

8.4 Comments Received and Answered

Following the formal public hearing, Appendix 6 will contain the following information:

- A typed list with the names and addresses of the people who attend the public hearing.
- A copy of any written comments that were received during the public comment period for the proposed project.
- The applicant's responses to the comments received.
- A description of any changes that were made to the project as a result of the public participation process.

8.5 Adoption of the Project Plan

The final project plan will be presented to the Grand Rapids City Commission during the April 28, 2020, regular session. Following this meeting, Appendix 7 will include the Resolution Adopting the Final Project Plan and the DWRF Project Plan Submittal Form. The *Disadvantaged Community Status Determination Worksheet* will be included with the final project plan.

Figures

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Hard copy is intended to be 11"x17" when plotted. Scale(s) indicated and graphic quality may not be accurate for any other size.

City of Grand Rapids
Kent County, Michigan
Drinking Water Revolving Fund (DWRF) Project Plan

Chester Township
Sparta Township
Algoma Township
City of Rockford
Spring Lake Township
City of Ferrysburg
Crockery Township
Polkton Township
City of Coopersville
Wright Township
Alpine Township
Plainfield Township
City of Grand Haven
Grand Haven Township
Robinson Township
Allendale Township
Tallmadge Township
Grand Rapids Township
Ada Township
Vergennes Township
Lake Michigan
WTP
Lake Michigan Filtration Plant
Allendale (M-45) Pump Station
PS
North Transmission Main
South Transmission Main
Ottawa County Complex
City of Walker
City of Grand Rapids
City of East Grand Rapids
Port Sheldon Township
Olive Township
Blendon Township
Georgetown Township
City of Grandville
City of Wyoming
City of Kentwood
Cascade Township
Lowell Township
City of Hudsonville
Holland Township
Park Township
City of Zeeland
Zeeland Township
Jamestown Township
Byron Township
Gaines Township
City of Holland

LEGEND
- Water Transmission Main
- City of Grand Rapids Water Service Area
- Water Utility Service District (Contract Area)
- Water Urban Utility Boundary

WATER SERVICE AREA
NORTH
0 1 2 MILES

PROJECT NO.
190666

FIGURE NO.
1

PLOT INFO: Z:\190666 City of Grand Rapids\GIS\MapDoc\DWRF_Water Service Area.mxd Date: 12/31/2019 9:43:35 AM User: mclazar

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NORTH WALKER TANK
LEONARD TANK
WILSON RESERVIOR
COVELL RESERVOIR
KNAPP TANK
DEAN LAKE RESERVOIR
MONROE RESERVOIR
LIVINGSTON RESERVOIR
FRANKLIN RESERVOIR
ADA TANK
TULIP TANK
CAMBRIDGE TANK
EGR TANK
BURTON RESERVOIR
ALGER RESERVOIR
PATTERSON TANK
EAST PARIS RESERVOIR

Alpine Township
Plainfield Township
Cannon Township
Grattan Township
Grand Rapids Township
Ada Township
Vergennes Township
City of Grand Rapids
City of Walker
City of East Grand Rapids
City of Wyoming
City of Kentwood
Cascade Township
Lowell Township
Gaines Township

LEGEND

- PS — Water Pump Stations
- Water Reservoir
- Water Tank
- Transmission Main
- Water Main

Pressure Districts

- 28TH ST
- 36TH ST
- ADA TWP
- ALGER
- CASCADE REGULATED
- EAST GRAND RAPIDS
- EAST HIGH
- INTERMEDIATE
- LOW
- NORTH WALKER HIGH
- SOUTH WALKER REGULATED
- TULIP
- WEST HIGH
- WEST REGULATED

NORTH

WATER DISTRIBUTION SYSTEM

0 1 2 MILES

PLOT INFO: \\fb-arcgis\projects\190666 City of Grand Rapids\GIS\MapDoc\DWRF Project Plan\DWRF_Water Distribution System.mxd Date: 3/9/2020 4:23:26 PM User: mclazar

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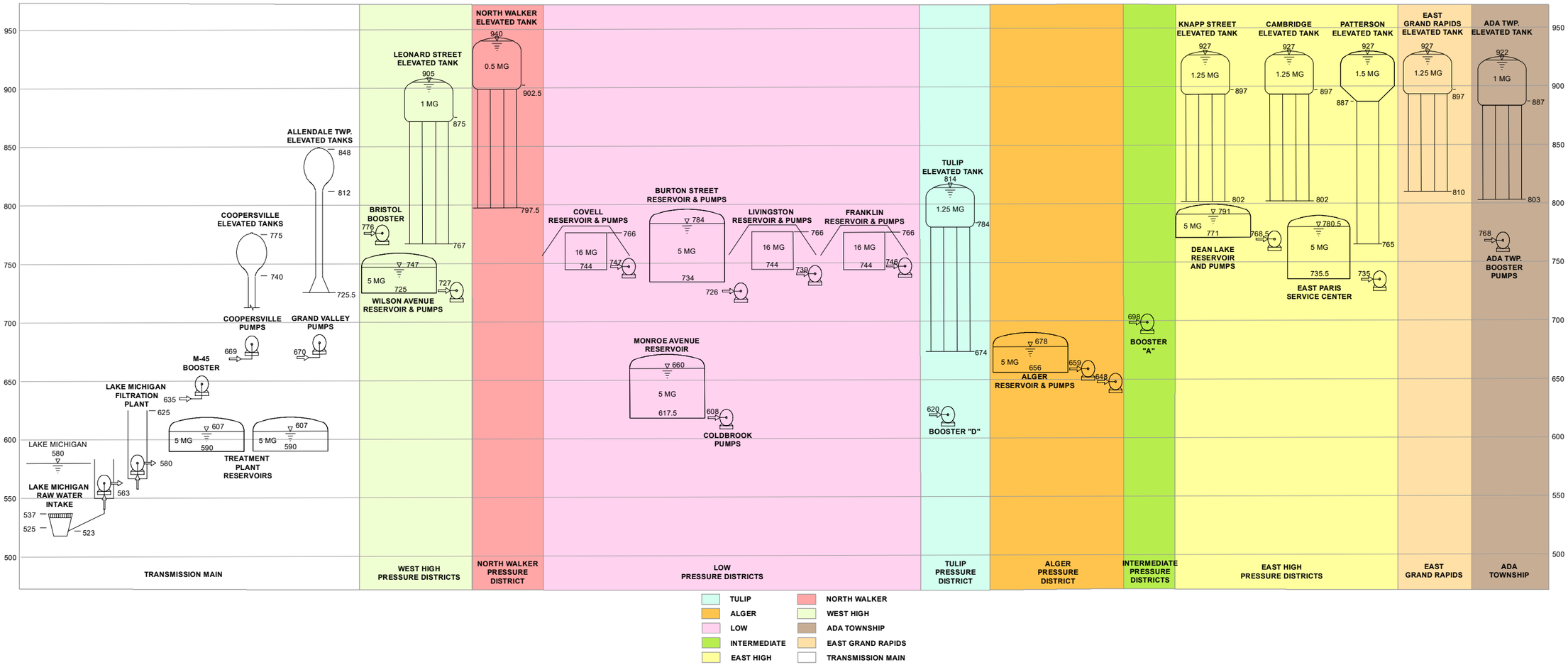
City of Grand Rapids
Kent County, Michigan
Drinking Water Revolving Fund (DWRF) Project Plan

PROJECT NO.
190666

FIGURE NO.
2



HYDRAULIC PROFILE

City of Grand Rapids
Kent County, Michigan

Drinking Water Revolving Fund (DWRF) Project Plan

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PROJECT NO.
190666

FIGURE NO.
3

PLOT INFO: Z:\190666 City of Grand Rapids\GIS\Map\Doc\DWRF Project Plan\DWRF_Hydraulic_Profile.mxd Date: 12/31/2019 2:24:11 PM User: mclazar

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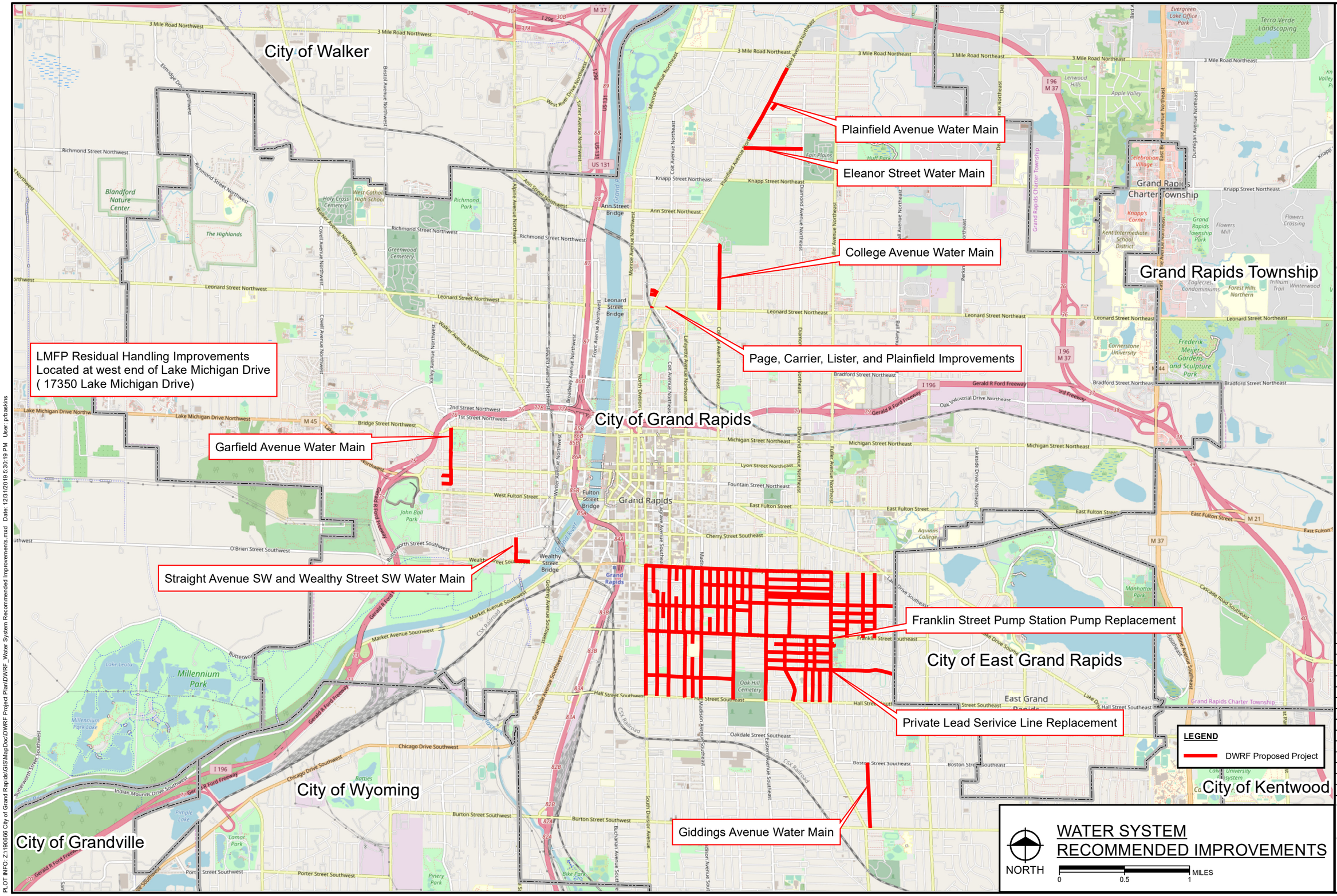

WATER SYSTEM RECOMMENDED IMPROVEMENTS

City of Grand Rapids
Kent County, Michigan

Drinking Water Revolving Fund (DWRF) Project Plan

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PROJECT NO.
190666

FIGURE NO.
4

PLOT INFO: Z:\190666 City of Grand Rapids\GIS\Map Docs\DWRF Project Plan\DWRF_Water System Recommended Improvements.mxd Date: 12/31/2019 5:30:19 PM User: prbaskins

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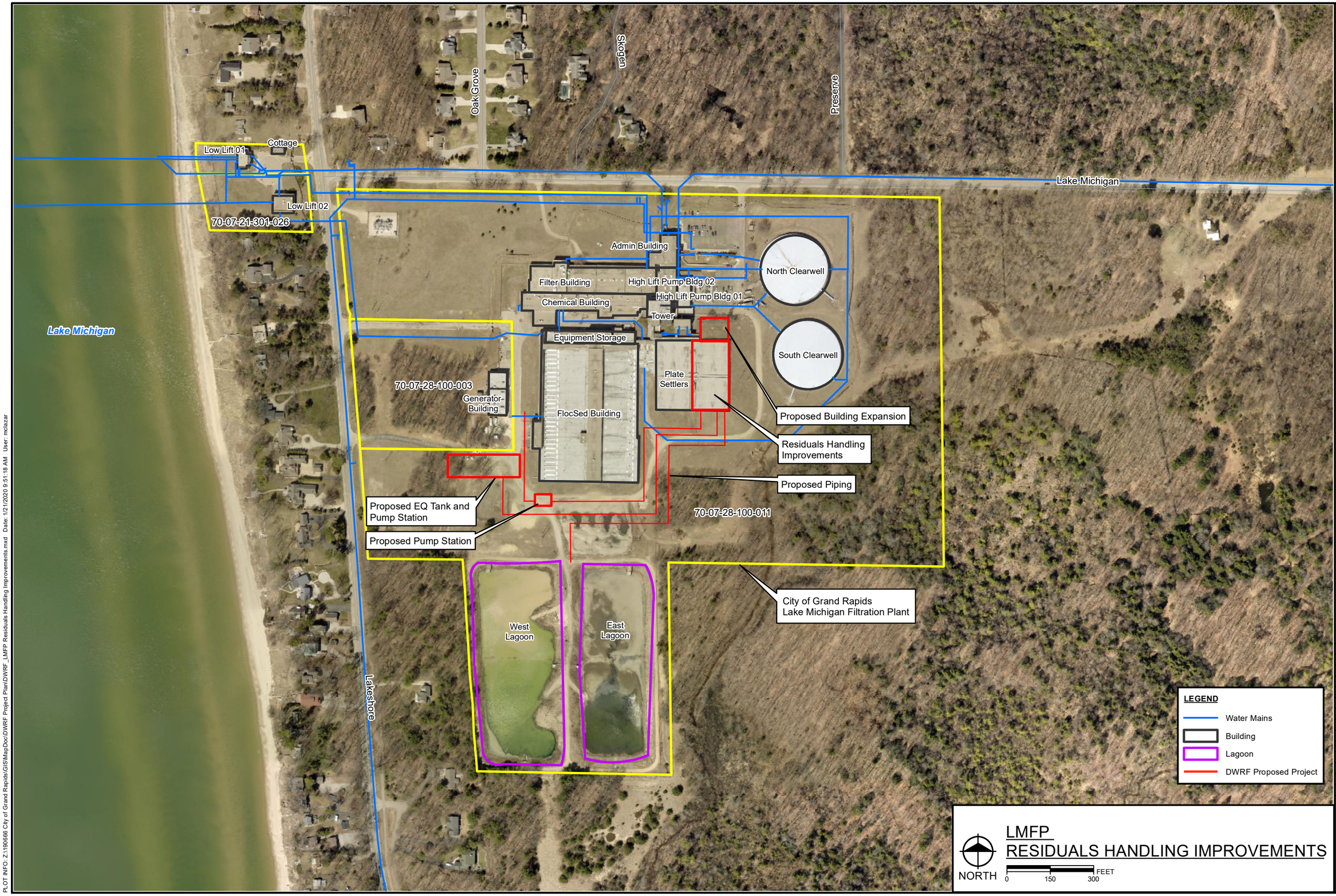

LMFP
RESIDUALS HANDLING IMPROVEMENTS

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Kent County, Michigan

Drinking Water Revolving Fund (DWRF) Project Plan

PROJECT NO.
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FIGURE NO.
5

PLOT INFO: Z:\190666 City of Grand Rapids\GIS\MapDoc\DWRF Project Plan\DWRF_LMFP Residuals Handling Improvements.mxd Date: 1/21/2020 9:51:18 AM User: mclazar

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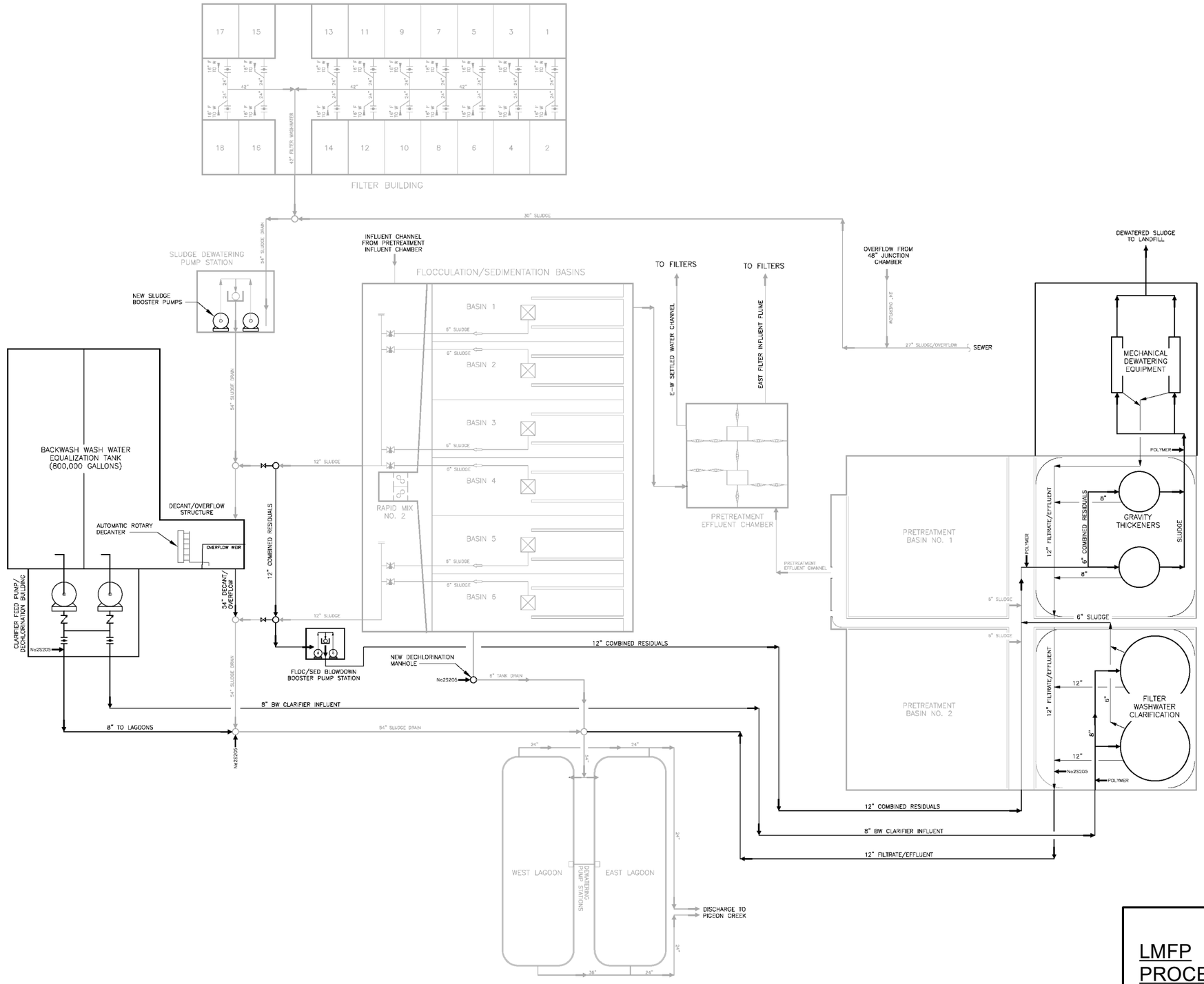

LMFP
PROCESS FLOW SCHEMATIC

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Kent County, Michigan

Drinking Water Revolving Fund (DWRF) Project Plan

PROJECT NO.
190666

FIGURE NO.
6

PLOT INFO: \\fb-arcgis\projects\190666 City of Grand Rapids\GIS\MapDoc\DWRF Project Plan\DWRF_LMFP Process Flow Schematic.mxd Date: 3/9/2020 4:17:49 PM User: mclazar

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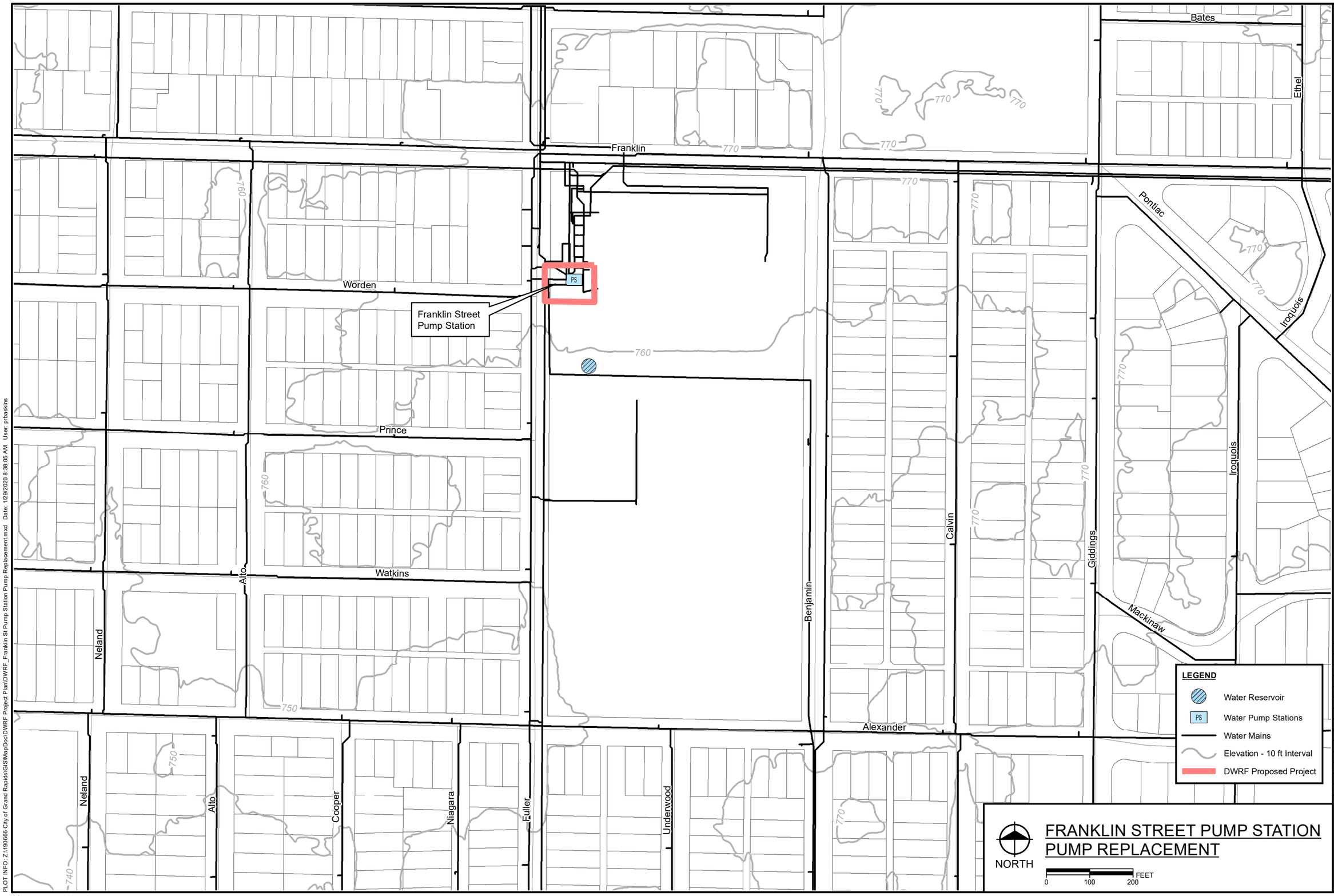

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Drinking Water Revolving Fund (DWRF) Project Plan

PROJECT NO.
190666

FIGURE NO.
7

PLOT INFO: Z:\190666 City of Grand Rapids\GIS\MapDoc\DWRF Project Plan\DWRF_Franklin St Pump Station Pump Replacement.mxd Date: 1/29/2020 8:38:05 AM User: prbaskins

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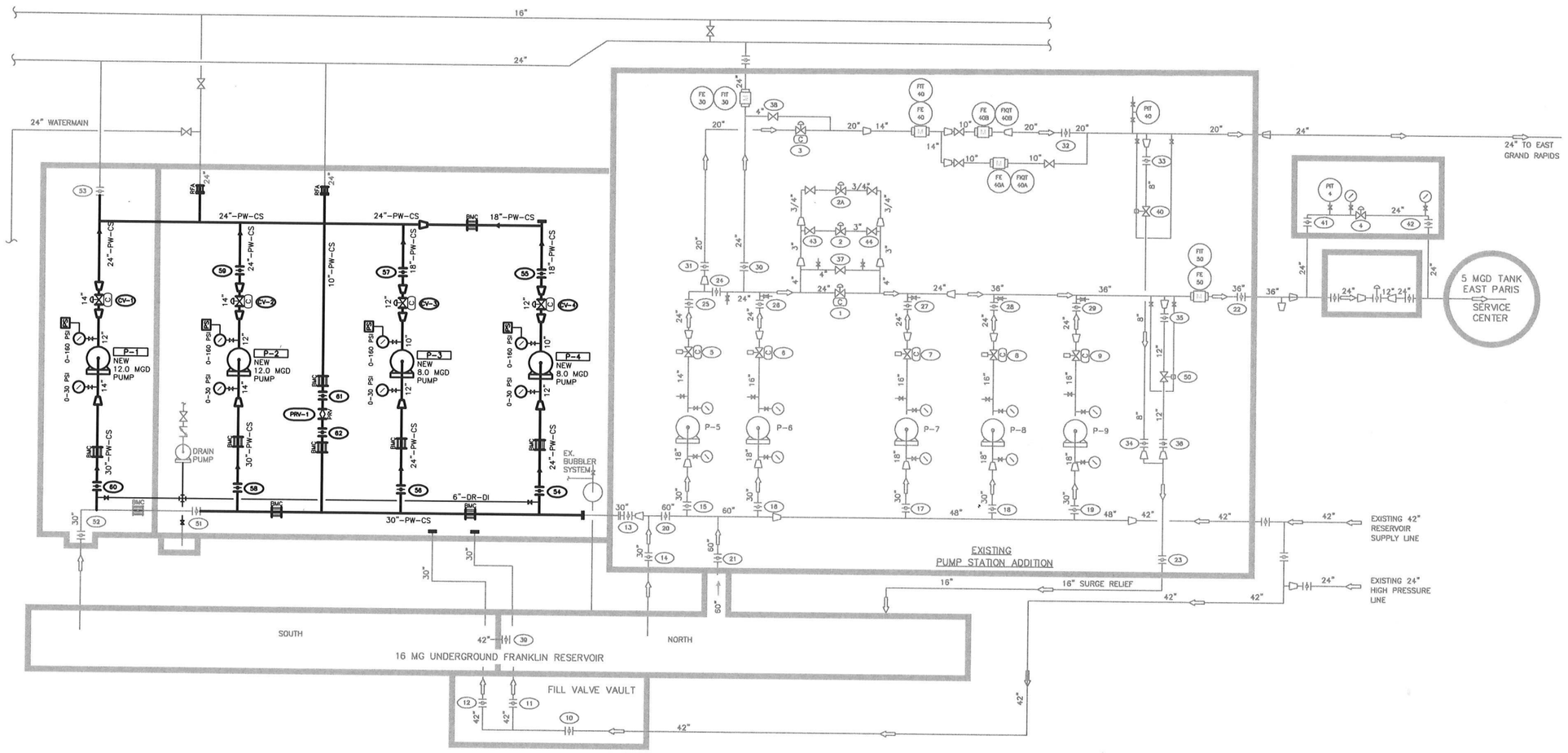

FRANKLIN STREET PUMP STATION
PIPING AND INSTRUMENTATION DIAGRAM

PROJECT NO. 190666

FIGURE NO. 8

City of Grand Rapids
Kent County, Michigan

Drinking Water Revolving Fund (DWRF) Project Plan

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Forrest
North
Cole
Fern
Sweet
Fairlane
Kent Hills
Marietta
Quimby
Rehoboth
Ames
Spencer
Fernando
Curtis
College
Ford
Paris
Brenner
Union
Ashland
Page
Penn
Portland
Eastern
Lafayette
Maude
Carrier
Leonard

LEGEND

- Currently closed valve; to be opened after project
- Water Mains
- Currently dead end water main; to be looped after project
- Elevation - 10 ft Interval

Proposed Improvement

- High Pressure Water Main
- Medium Pressure Water Main

NORTH

0 100 200 FEET

COLLEGE AVENUE WATER MAIN

PROJECT NO. 190666

FIGURE NO. 9

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Kent County, Michigan

Drinking Water Revolving Fund (DWRF) Project Plan

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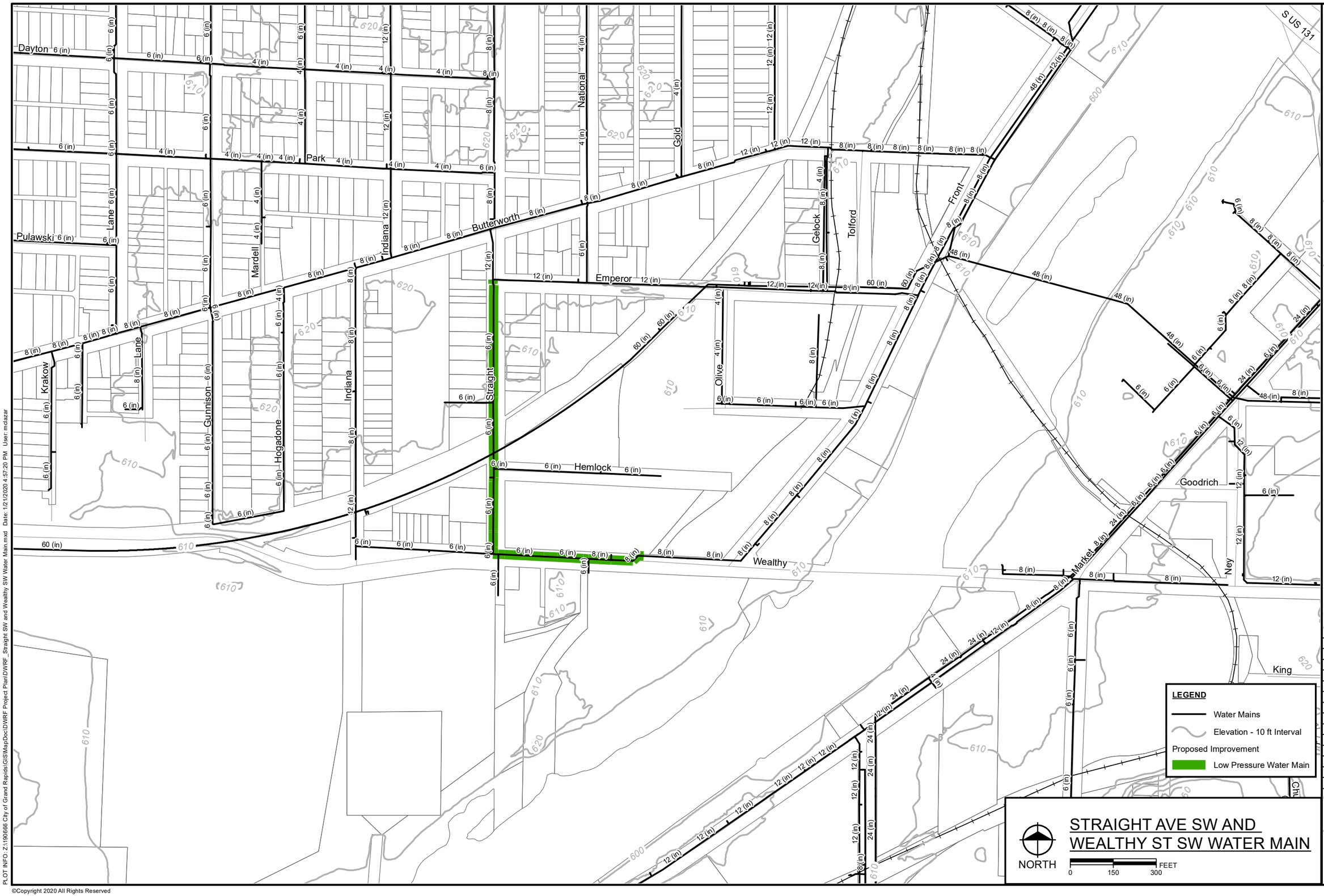

STRAIGHT AVE SW AND WEALTHY ST SW WATER MAIN

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Kent County, Michigan

Drinking Water Revolving Fund (DWRF) Project Plan

PROJECT NO.
190666

FIGURE NO.
10

PLOT INFO: Z:\190666 City of Grand Rapids\GIS\MapDoc\DWRF Project Plan\DWRF_Straight SW and Wealthy SW Water Main.mxd Date: 12/1/2020 4:57:20 PM User: mdazar

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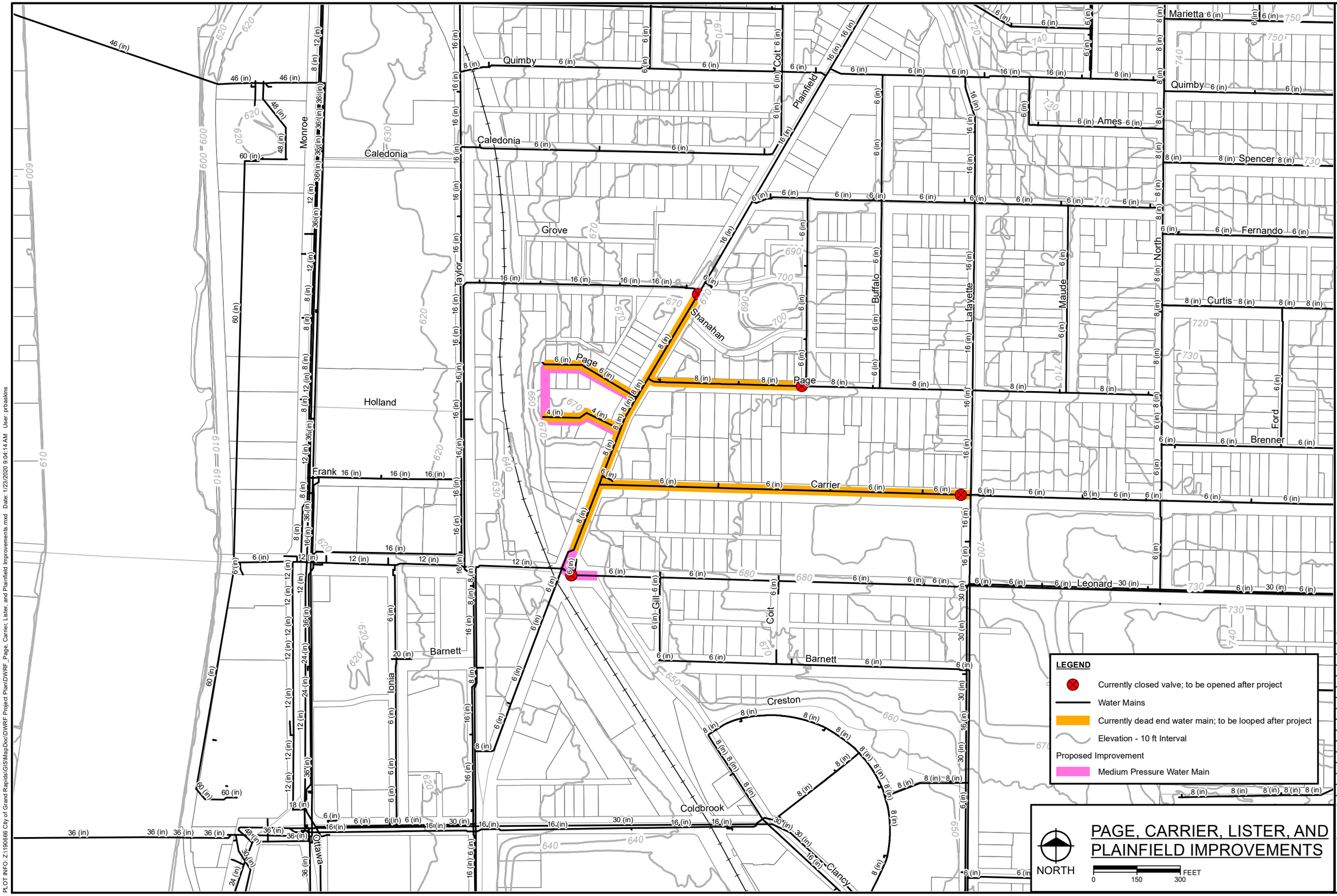

PAGE, CARRIER, LISTER, AND PLAINFIELD IMPROVEMENTS

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Kent County, Michigan

Drinking Water Revolving Fund (DWRF) Project Plan

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PROJECT NO.
190666

FIGURE NO.
11

PLOT INFO: Z:\190666 City of Grand Rapids\GIS\MapDoc\DWRF Project Plan\DWRF_Page, Carrier, Lister, and Plainfield Improvements.mxd Date: 1/23/2020 9:04:14 AM User: prbaskins

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Kent County, Michigan

Drinking Water Revolving Fund (DWRF) Project Plan

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LEGEND

- Water Mains
- Elevation - 10 ft Interval
- DWRF Proposed Project

NORTH

PRIVATE LEAD SERVICE LINE REPLACEMENTT

0 200 400 FEET

PROJECT NO.
190666

FIGURE NO.
12

PLOT INFO: Z:\190666 City of Grand Rapids\GIS\MapDoc\DWRF Project Plan\DWRF_Private Lead Service Line Replacement.mxd Date: 1/29/2020 8:46:12 AM User: pfbaskins

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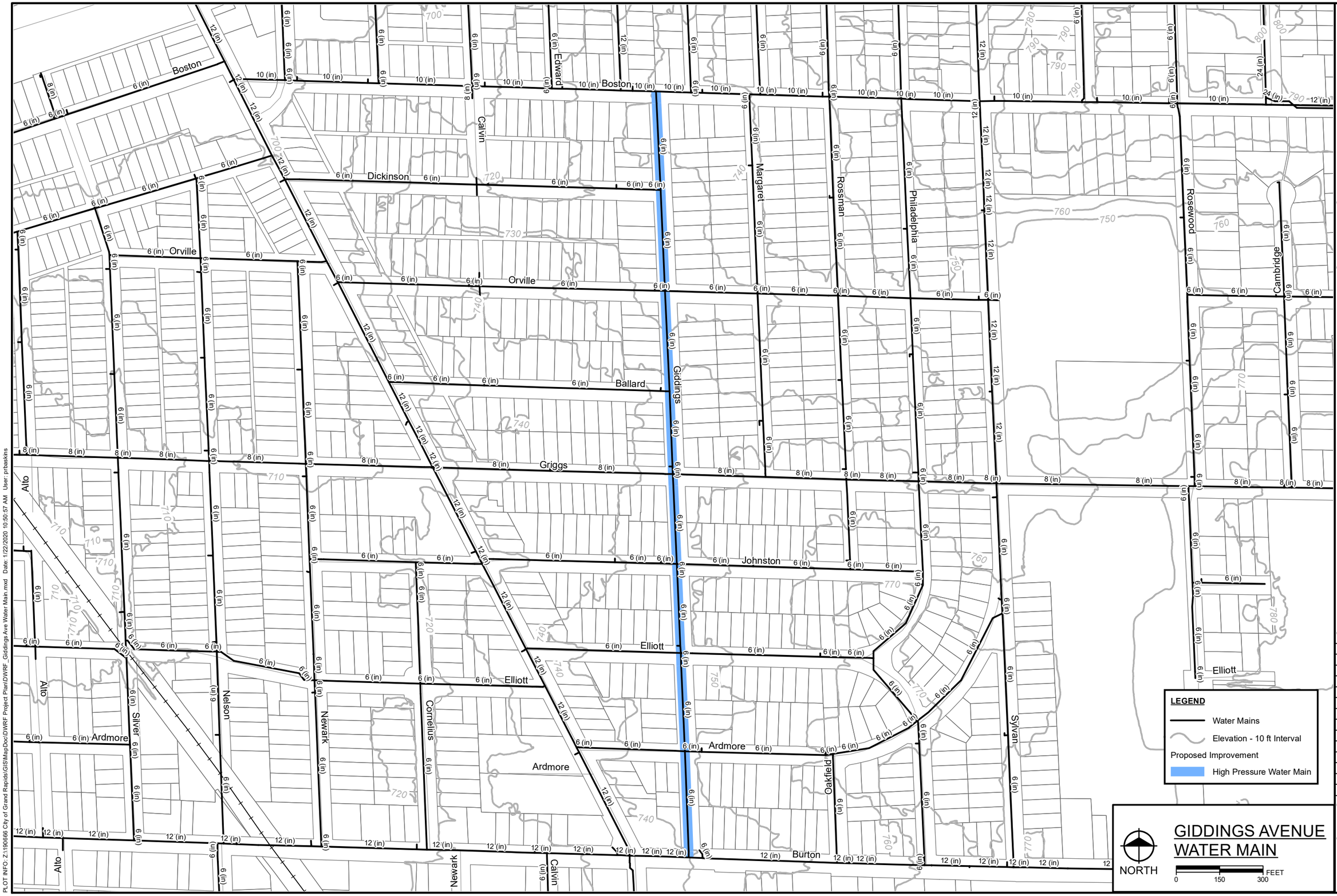

PLOT INFO: Z:\190666 City of Grand Rapids\GIS\MapDoc\DWRF Project Plan\DWRF_Giddings Ave Water Main.mxd Date: 1/22/2020 10:50:57 AM User: prbaskins

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Drinking Water Revolving Fund (DWRF) Project Plan

PROJECT NO.
190666

FIGURE NO.
13

LEGEND

- Currently closed valve; to be opened after project
- Water Mains
- Currently dead end water main; to be looped after project
- Elevation - 10 ft Interval

Proposed Improvement

- High Pressure Water Main
- Medium Pressure Water Main

NORTH

ELEANOR STREET WATER MAIN

0 100 200 FEET

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Kent County, Michigan

Drinking Water Revolving Fund (DWRF) Project Plan

PROJECT NO.
190666

FIGURE NO.
14

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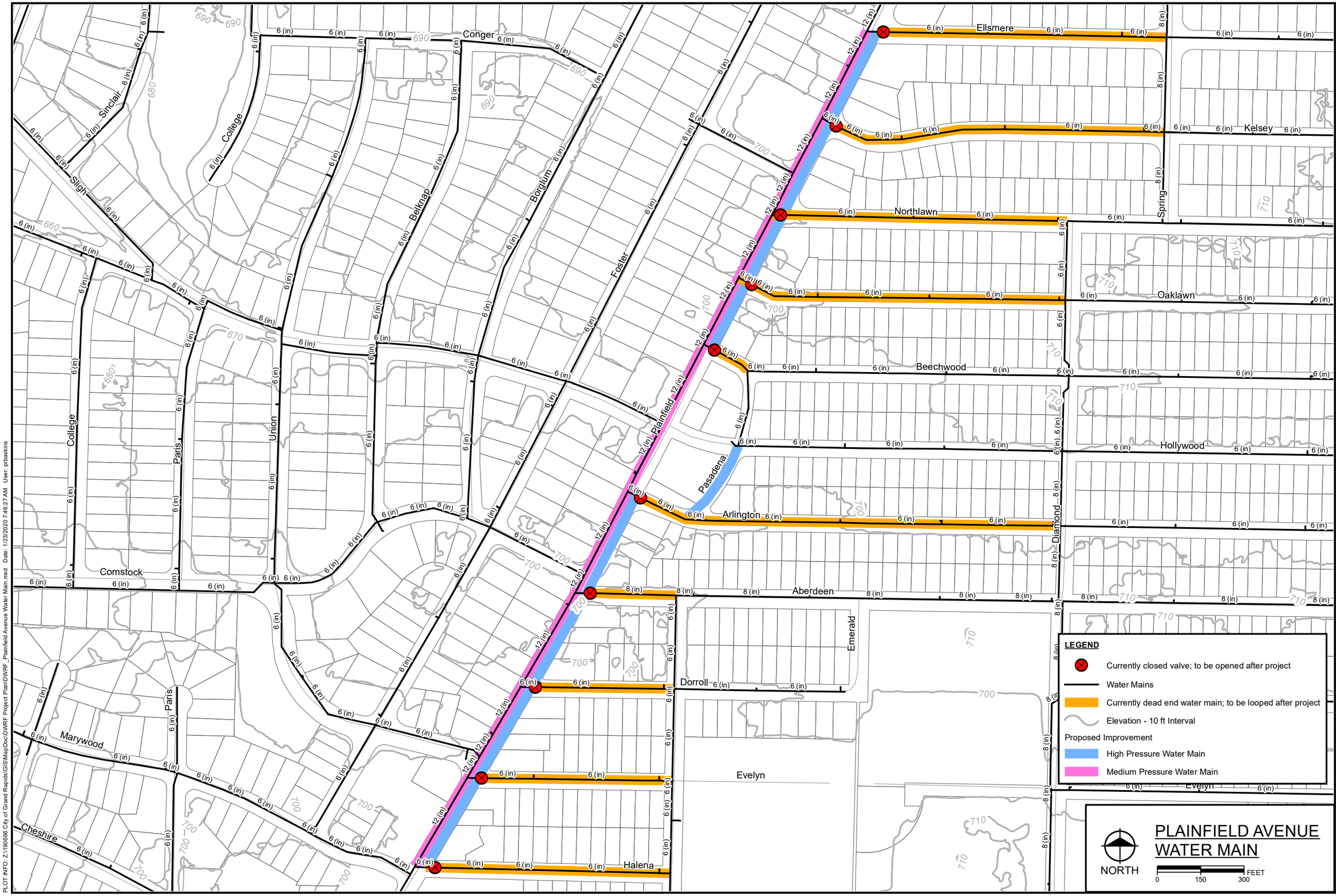

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Kent County, Michigan

Drinking Water Revolving Fund (DWRF) Project Plan

PROJECT NO.
190666

FIGURE NO.
15

PLOT INFO: Z:\190666 City of Grand Rapids\GIS\MapDoc\DWRF Project Plan\DWRF_Plainfield Avenue Water Main.mxd Date: 1/23/2020 7:46:27 AM User: prbaskins

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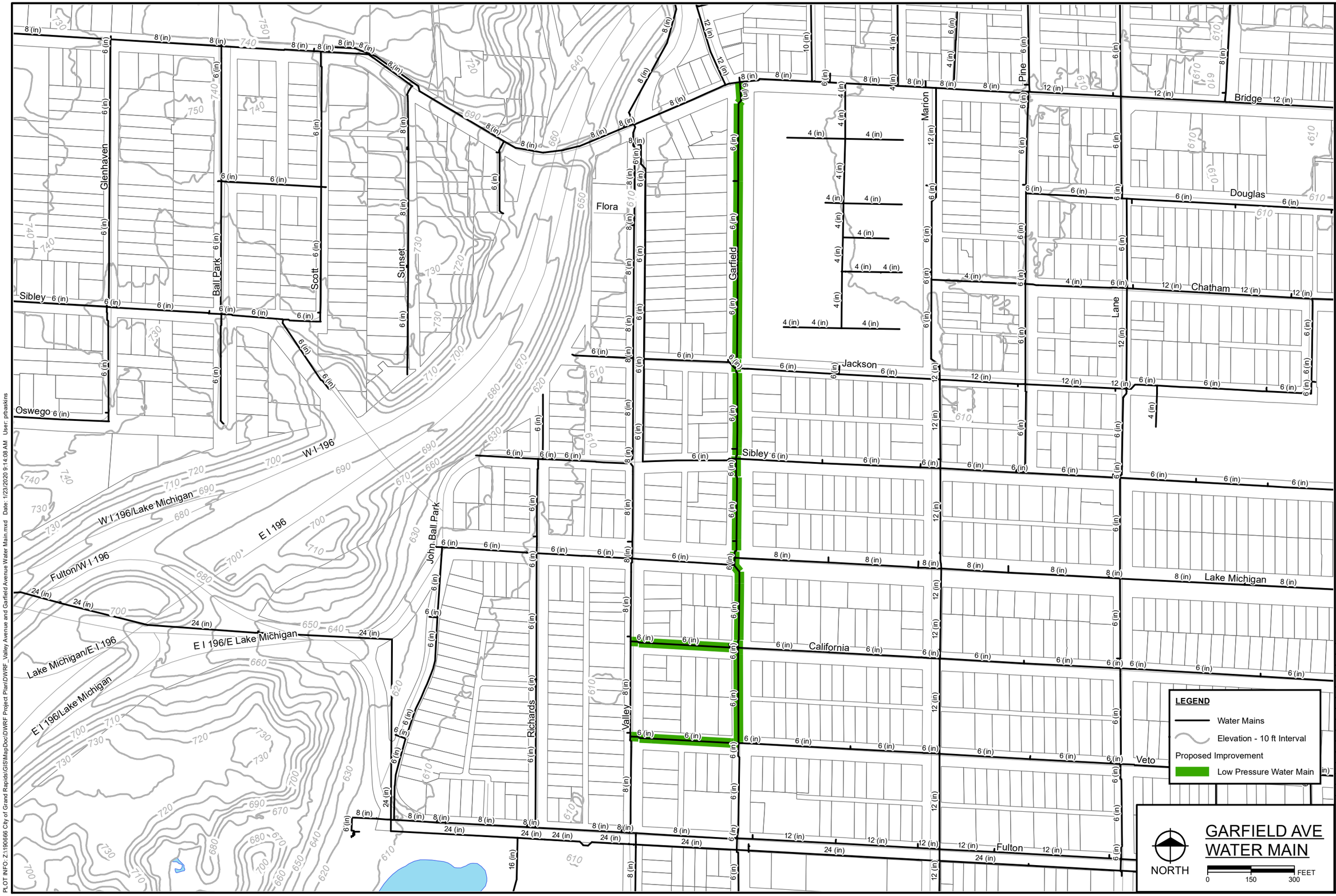

PLOT INFO: Z:\190666 City of Grand Rapids\GIS\MapDoc\DWRF Project Plan\DWRF_Valley Avenue and Garfield Avenue Water Main.mxd Date: 1/23/2020 9:14:08 AM User: prbaskins

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Drinking Water Revolving Fund (DWRF) Project Plan

GARFIELD AVE WATER MAIN

PROJECT NO.
190666

FIGURE NO.
16

Maps

LMFP Residual Handling Improvements
Located at west end of Lake Michigan Drive
(17350 Lake Michigan Drive)

Garfield Avenue Water Main

Straight Avenue SW and Wealthy Street SW Water Main

Plainfield Avenue Water Main

Eleanor Street Water Main

College Avenue Water Main

Page, Carrier, Lister, and Plainfield Improvements

Giddings Avenue Water Main

Franklin Street Pump Station Pump Replacement

Private Lead Serivice Line Replacement

City of Walker
City of Grand Rapids
Grand Rapids Township
City of East Grand Rapids
City of Wyoming
City of Kentwood

LEGEND

- PFAS - 70 ppt PFOS + PFOA
- Part 213- Active Leaking Underground Storage Tank
- Part 213- Closed Leaking Underground Storage Tank
- Part 201- Environmental Contamination Site
- DWRF Proposed Project

NORTH

ENVIRONMENTAL CONTAMINATION

0 0.5 1 MILES

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Kent County, Michigan

Drinking Water Revolving Fund (DWRF) Project Plan

PROJECT NO.
190666

Map
1

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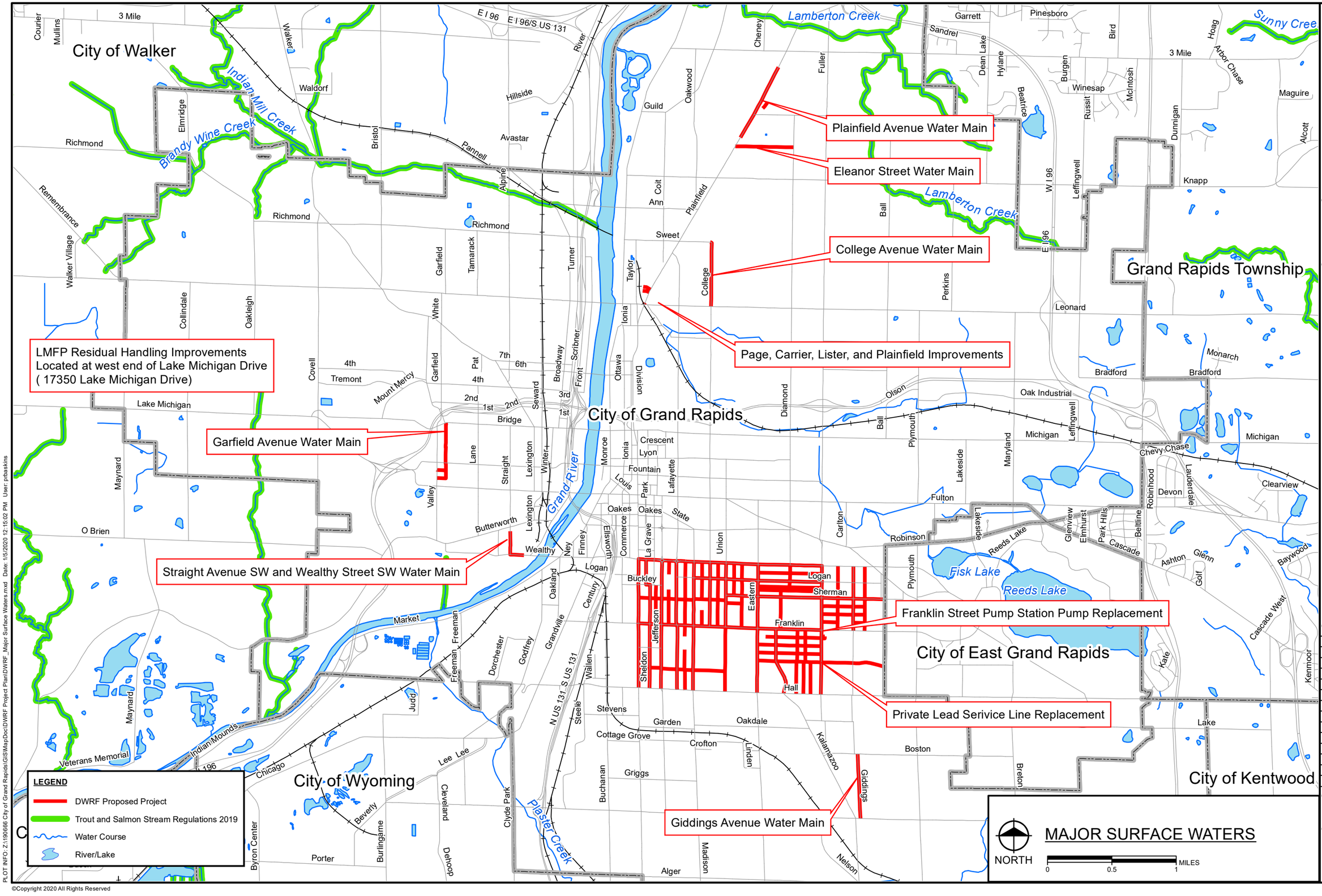

PLOT INFO: Z:\190666 City of Grand Rapids\GIS\MapDoc\DWRF Project Plan\DWRF_Major Surface Waters.mxd Date: 1/5/2020 12:15:02 PM User: pbaskins

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Drinking Water Revolving Fund (DWRF) Project Plan

PROJECT NO.
190666

Map
2

MAJOR SURFACE WATERS

LMFP Residual Handling Improvements
Located at west end of Lake Michigan Drive
(17350 Lake Michigan Drive)

Garfield Avenue Water Main

Straight Avenue SW and Wealthy Street SW Water Main

Plainfield Avenue Water Main

Eleanor Street Water Main

College Avenue Water Main

Page, Carrier, Lister, and Plainfield Improvements

Giddings Avenue Water Main

Franklin Street Pump Station Pump Replacement

Private Lead Serivice Line Replacement

City of Walker
City of Grand Rapids
Grand Rapids Township
City of East Grand Rapids
City of Wyoming
City of Kentwood

Lamberton Creek
Indian Mill Creek
Brandy Wine Creek
Grand River
Plaster Creek
Fisk Lake
Reeds Lake
Sunny Cree

LEGEND

- DWRF Proposed Project
- Water Course
- River/Lake

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

NORTH

WETLANDS

0 0.5 1 MILES

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Kent County, Michigan

Drinking Water Revolving Fund (DWRF) Project Plan

PROJECT NO.
190666

Map
3

LMFP Residual Handling Improvements
Located at west end of Lake Michigan Drive
(17350 Lake Michigan Drive)

Garfield Avenue Water Main

Straight Avenue SW and Wealthy Street SW Water Main

Plainfield Avenue Water Main

Eleanor Street Water Main

College Avenue Water Main

Page, Carrier, Lister, and Plainfield Improvements

Giddings Avenue Water Main

Franklin Street Pump Station Pump Replacement

Private Lead Serivice Line Replacement

City of Walker
City of Grand Rapids
Grand Rapids Township
City of East Grand Rapids
City of Wyoming
City of Kentwood

Lamberton Creek
Brandy Wine Creek
Indian Mill Creek
Grand River
Plaster Creek
Fisk Lake
Reeds Lake
Sunny Cree

3 Mile
Lake Michigan
E I 96
E I 96/S US 131
W I 96
E I 196
N US 131
S US 131

LEGEND

- DWRF Proposed Project
- 100 Year Flood Boundary
- 500 Year Flood Boundary

NORTH

0 0.5 1 MILES

FEMA FLOOD PLAIN

City of Grand Rapids
Kent County, Michigan

Drinking Water Revolving Fund (DWRF) Project Plan

PROJECT NO.
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Map
4

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Located at west end of Lake Michigan Drive
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Garfield Avenue Water Main

Straight Avenue SW and Wealthy Street SW Water Main

Plainfield Avenue Water Main

Eleanor Street Water Main

College Avenue Water Main

Page, Carrier, Lister, and Plainfield Improvements

Giddings Avenue Water Main

Franklin Street Pump Station Pump Replacement

Private Lead Serivice Line Replacement

City of Walker
City of Grand Rapids
Grand Rapids Township
City of East Grand Rapids
City of Wyoming
City of Kentwood

LEGEND

DWRF Proposed Project

Prime Farmland Soils

All areas are prime farmland

Farmland of local importance

Prime farmland if drained

PRIME FARMLAND

NORTH

0 0.5 1 MILES

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City of Grand Rapids
Kent County, Michigan

Drinking Water Revolving Fund (DWRF) Project Plan

PROJECT NO.
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Map
5

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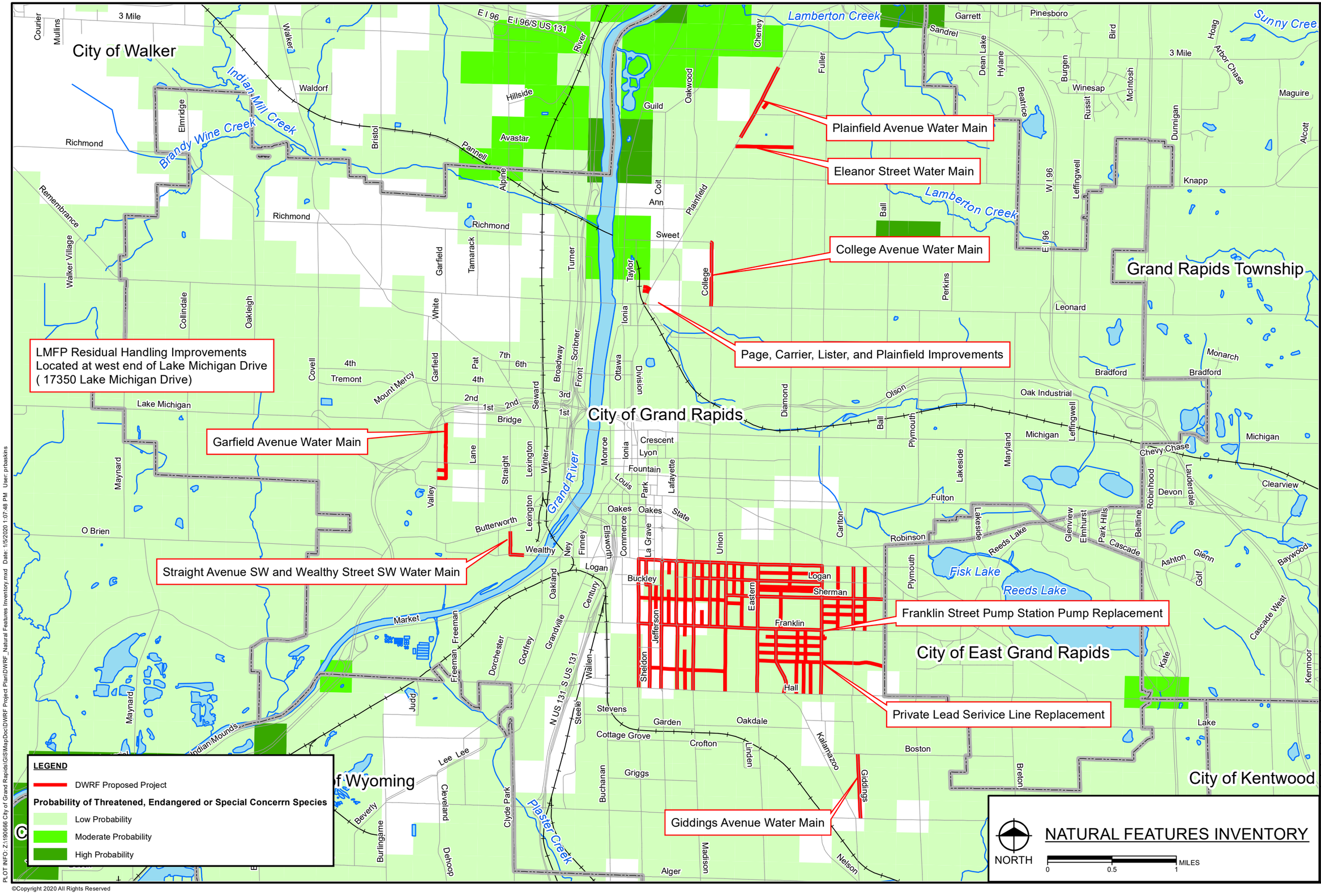

NATURAL FEATURES INVENTORY

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Kent County, Michigan
Drinking Water Revolving Fund (DWRF) Project Plan

PROJECT NO.
190666

Map
6

PLOT INFO: Z:\190666 City of Grand Rapids\GIS\Map Docs\DWRF Project Plan\DWRF_Natural Features Inventory.mxd Date: 1/5/2020 1:07:48 PM User: prbaskins

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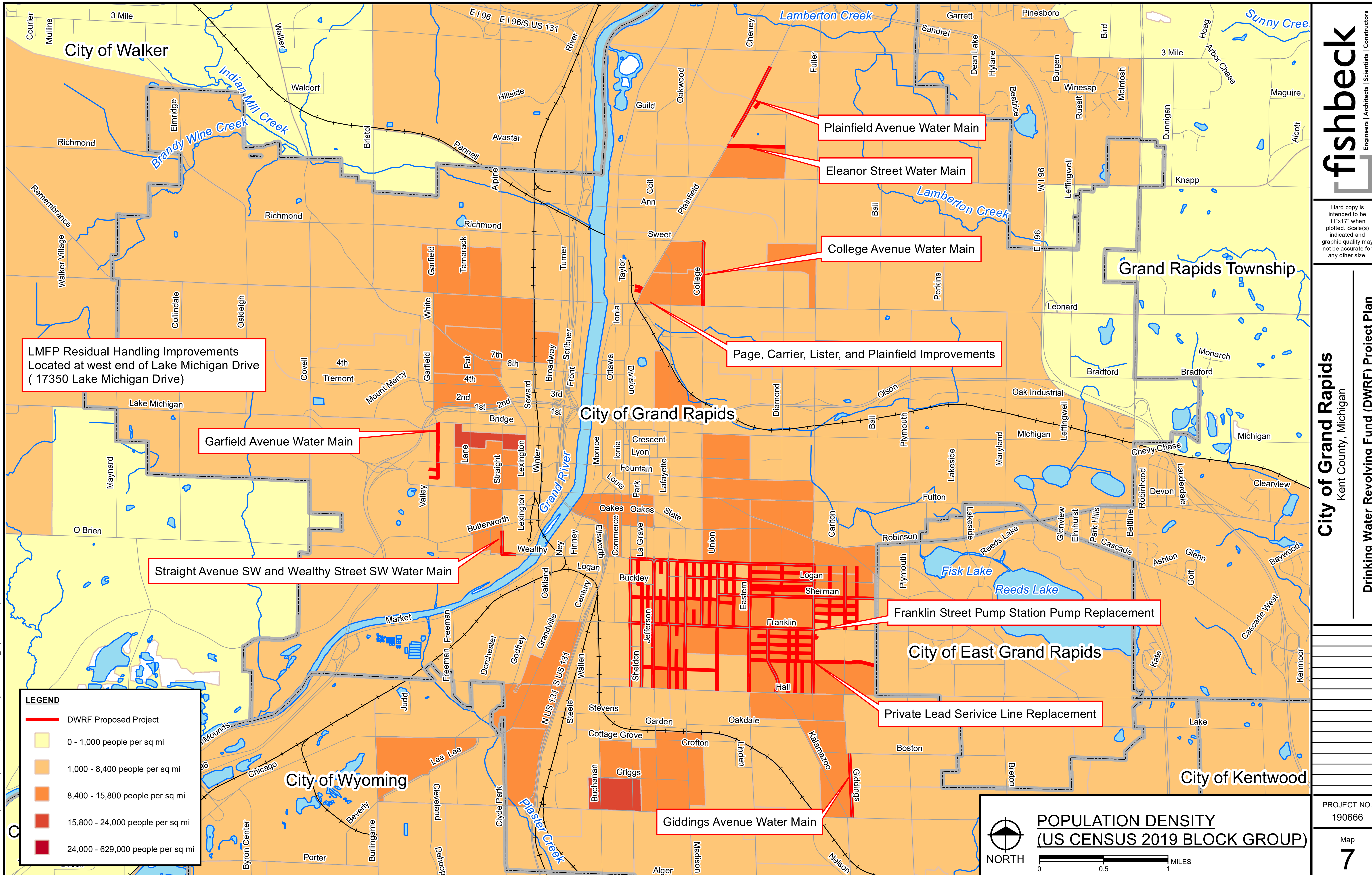

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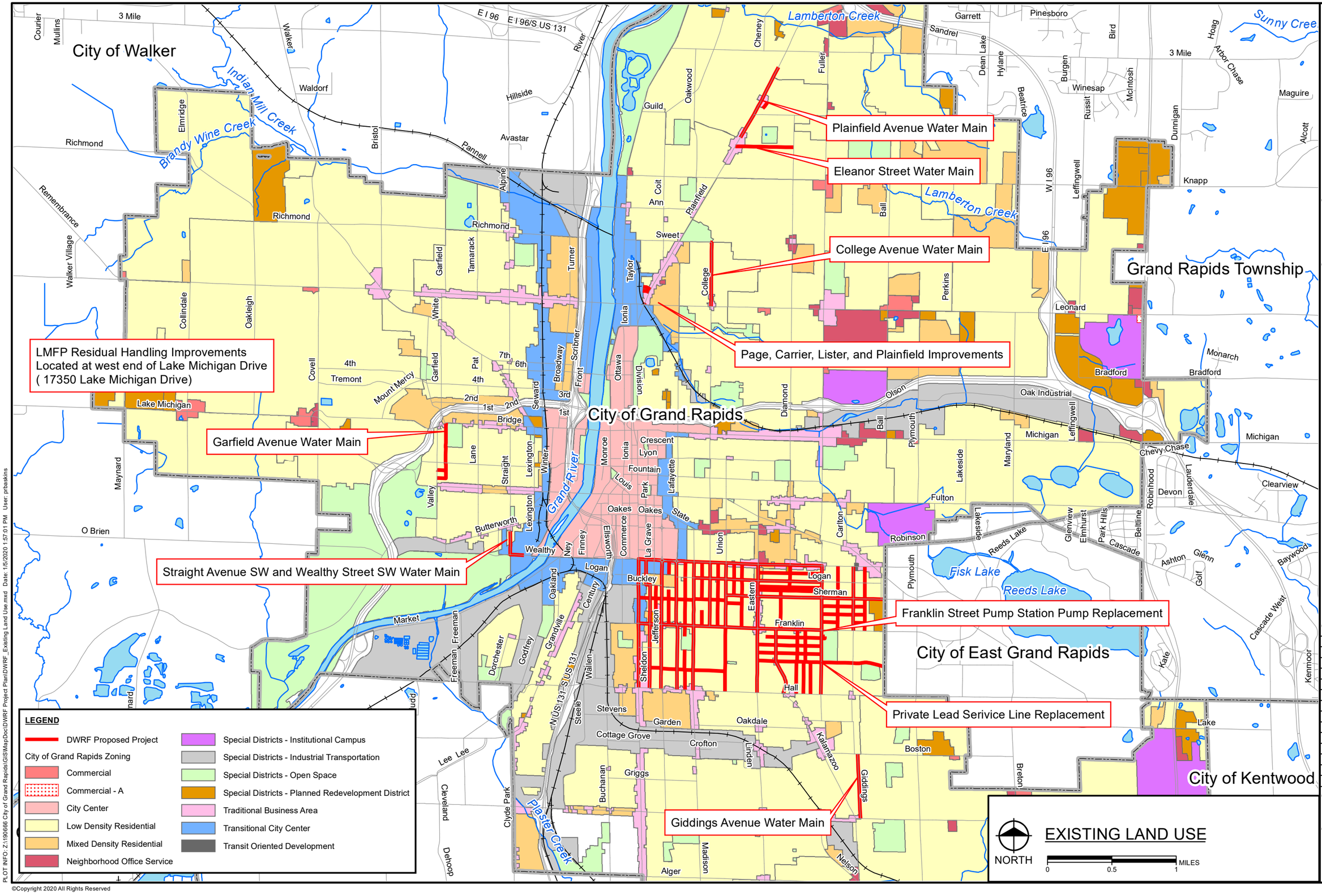

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Drinking Water Revolving Fund (DWRF) Project Plan

EXISTING LAND USE

PROJECT NO.
190666

Map
8

LMFP Residual Handling Improvements
Located at west end of Lake Michigan Drive
(17350 Lake Michigan Drive)

Garfield Avenue Water Main

Straight Avenue SW and Wealthy Street SW Water Main

Plainfield Avenue Water Main

Eleanor Street Water Main

College Avenue Water Main

Page, Carrier, Lister, and Plainfield Improvements

Franklin Street Pump Station Pump Replacement

Private Lead Serivice Line Replacement

Giddings Avenue Water Main

City of Walker
City of Grand Rapids
Grand Rapids Township
City of Wyoming
City of East Grand Rapids
City of Kentwood

REGIS Planned Land Use
(Regional Classes)

- Agriculture (A)
- Airport (ARP)
- Commercial (C)
- Conservation (CON)
- Hydro
- Industrial (I)
- Institutional (INT)
- Mixed Use (MU)
- Office (O)
- Open Space (OS)
- Residential (R)
- Right Of Way (ROW)
- Utility (UTL)

LEGEND

DWRF Proposed Project

NORTH

0 0.5 1 MILES

PLANNED LAND USE

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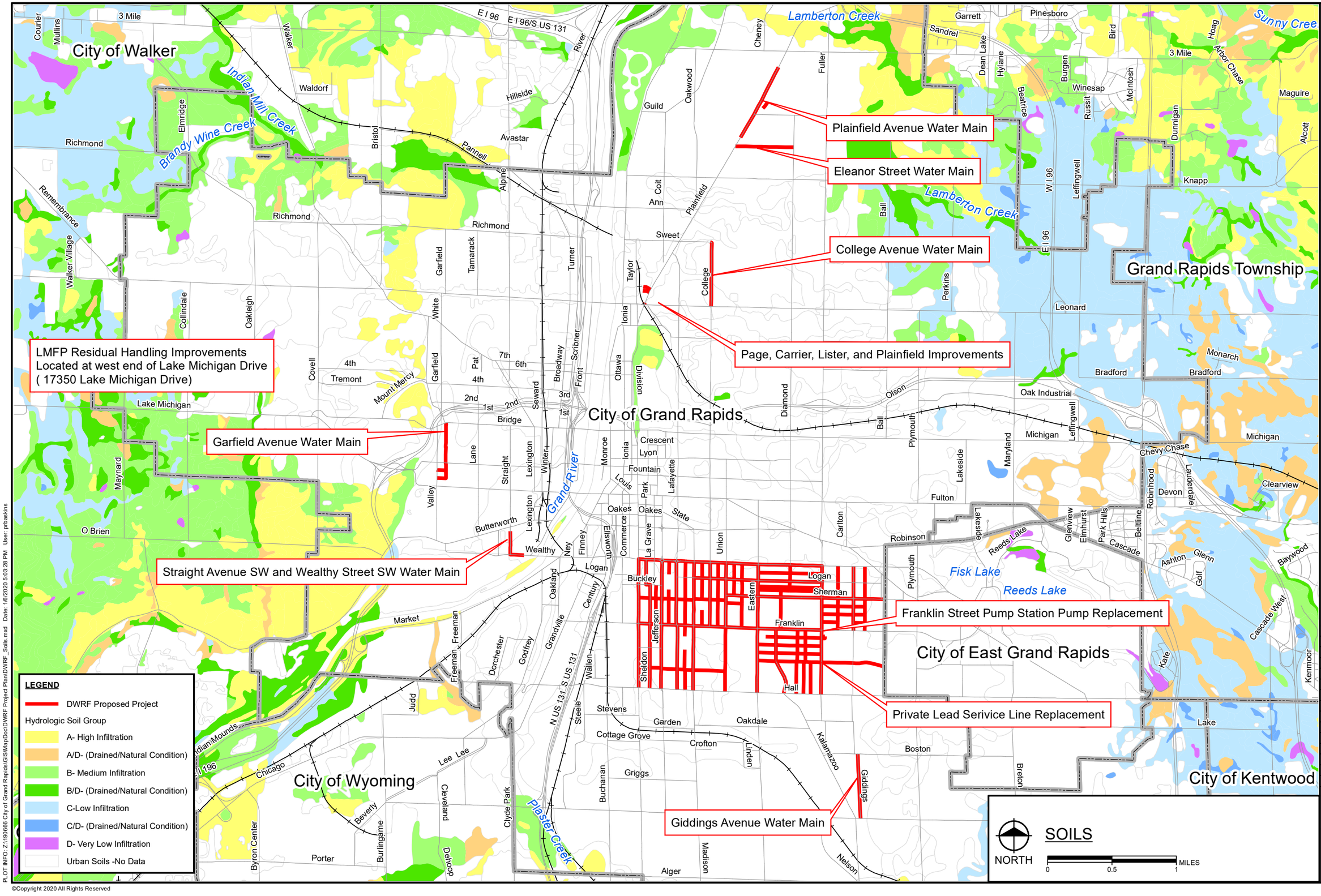
Drinking Water Revolving Fund (DWRF) Project Plan

PROJECT NO.
190666

Map
9



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City of Grand Rapids
Kent County, Michigan

Drinking Water Revolving Fund (DWRF) Project Plan

PROJECT NO.
190666

Map
10

Appendix 1

City of Grand Rapids

2020 DWRF Project Plan

Lake Michigan Filtration Plant

Project 190666

Summary of Process Facilities at Lake Michigan Filtration Plant

A.	Lake Michigan Intakes			
	1. Intake 1 (Constructed 1939)			
		a. Pipe size, inches (in)	54	
		b. Pipe material	Steel	
		c. Pipe length, feet (ft)	6100	
		d. Crib	36’ x 36’ x10’ timber	
		e. Reported capacity, million gallons per day (mgd)	56	
		f. Mussel control	Crib chlorination Bronze bar racks	
		g. Typical Use	Winter with North Low Lift Station	
	2. Intake 2 (Constructed 1992)			
		a. Pipe size, in.	66	
		b. Pipe material	Concrete	
		c. Pipe length, ft.	4,850	
		d. Crib	62’ diameter x11’ 12-sided timber	
		e. Reported capacity, mgd	111	
		f. Mussel control	Crib chlorination Copper sheathed inlet timbers	
		g. Typical Use	Summer with South Low Lift Station	
B.	Low Lift Pumping Stations			
	1. North Low Lift Pumping Station (Constructed 1939)			
		a. Screen		
		1) Number	1	
		2) Type	Manual winch lift	
		3) Overall size	60” x 60”	
		4) Opening size	7/8”	
		5) Cleaning frequency	Approx. monthly	
		b. Number of pumps	4	
		c. Pump Type	Constant speed vertical centrifugal	
		d. Capacities/ motor power		
		1) Low Lift Pump 1	25 mgd	300 horsepower (HP)
		2) Low Lift Pump 2	38.5 mgd	600 HP
		3) Low Lift Pump 3	38.5 mgd	600 HP
		4) Low Lift Pump 4	45 mgd	700 HP
		e. Discharge Pipe		
		1) Size, in.	46	
		2) Approx. length, ft.	2000	
		3) Flow metering	Venturi meter in vault	
	2. South Low Lift Pumping Station (Constructed 1992)			
		a. Screens		

1)	Number	2	
2)	Type	Manual winch lift	
3)	Overall size	7’-6” x 13’-6”	
4)	Cleaning frequency	Weekly	
b.	Number of pumps	3	
c.	Pump Type	Constant speed vertical mixed flow	
d.	Capacities/ motor power		
1)	Low Lift Pump 5	61.9 mgd	900 horsepower (HP)
2)	Low Lift Pump 6	46.7 mgd	600 HP
3)	Low Lift Pump 7	46.7 mgd	600 HP
e.	Discharge Pipe		
1)	Size, in.	60	
2)	Approx. length, ft.	1300	
3)	Flow metering	60” Venturi meter in vault	

C. Rapid Mixing

1. Rapid Mixing Facility 1 (Upstream of Pretreatment Plate Settlers, Constructed 1992)

a.	Number of tanks	2
b.	Size, each	
1)	Dimensions	11’ x 11’ x 15.5’ surface water depth (SWD)
2)	Volume, gal	14,000
c.	Detention time at 56.8 mgd, sec	42.5
d.	Mixers, each tank	
1)	Type	Variable speed axial flow turbine
2)	Mfr and model	Philadelphia 3805Q
3)	Motor horsepower	10
4)	Mixer full speed, revolutions per minute (rpm)	68
5)	Number of blades	3
6)	Blade length, in.	59
7)	Typical operating speed (%)	70 per Environment, Great Lakers & Energy (EGLE)
8)	Typical G value range, 1/sec	272-335 per EGLE

2. Rapid Mixing Facility 2 (Upstream of Floc/Sed Basins, Constructed 1992)

a.	Number of Tanks	2
b.	Size, each	
1)	Dimensions	13.25’ x 13.25’ x 15.75’ SWD
2)	Volume, gal	20,600
c.	Detention time at 85.2 mgd, sec	42
d.	Mixers, ea. Tank	
1)	Type	Variable speed axial flow turbine
2)	Mfr and model	Philadelphia 3805Q
3)	Motor HP	15
4)	Mixer full speed, rpm	84
5)	Number of blades	3
6)	Blade length, in.	62
7)	Typical operating speed (%)	76 per EGLE
8)	Typical G value range, 1/sec	280-345 per EGLE

D. West Flocculation Basins (Constructed 1992, Upgraded 2019/2020)

1.	Number of basins	6 (Integral with Sedimentation Basins)
2.	Rated capacity each, mgd	14.2
3.	Total capacity, mgd	85.2
4.	Size, each basin	

a. Dimensions	75’ x 35’ x 15.5’ SWD
b. Volume, gal	304,342
5. Detention time at 14.2 mgd, min	31
6. Stage dimensions	
a. Stage 1	75’ x 8’ x 15.5’ SWD
b. Stage 2	75’ x 11’ x 15.5’ SWD
c. Stage 3	75’ x 16’ x 15.5’ SWD
7. Horizontal velocity at 14.2 mgd, ft/min	1.13
8. Mixers	
a. Type	Horizontal shaft paddles-variable speed
b. Shafts per basin	5
c. Stages per basin/shaft	3
d. Approx. paddle sizes	
1) Stage 1	6” x 4.5’
2) Stage 2	6” x 8’
3) Stage 3	6” x 10’
e. Number of paddles per stage	
1) Stage 1	12
2) Stage 2	6
3) Stage 3	4
f. Motor horsepower, each shaft	3 hp
g. Shaft speed range, rpm	0-4.49
h. Approx. 70 degree Fahrenheit G values at 3.11 rpm	
1) Stage 1, 1/sec	50
2) Stage 2, 1/sec	41
3) Stage 3, 1/sec	29
i. Approx. 33 degree Fahrenheit G values at 3.61 rpm	
1) Stage 1, 1/sec	50
2) Stage 2, 1/sec	41
3) Stage 3, 1/sec	29

E. Sedimentation Basins (Constructed 1992)

1. Number of basins	6 (Integral with Flocculation Basins)
2. Rated capacity each, mgd	14.2
3. Total capacity, mgd	85.2
4. Size, each basin	
a. Dimensions	75’ x 268’ x 16.5’ SWD
b. Volume, gal	2,480,742
5. Detention time at 14.2 mgd, min	251 (4.18 hours)
6. Surface loading at 14.2 mgd, gallons per minute (gpm)/sq ft	0.49
7. Horizontal velocity at 14.2 mgd, ft/min	1.06
8. Effluent troughs	
a. Type	Fiberglass reinforced plastic (FRP) with submerged orifices
b. Number per basin	32
c. Length each trough, ft	17.5
d. Total weir length per basin, ft	1,120
e. Weir loading at 14.2 mgd, gal/day/ft	12,680
f. Orifices per trough	34
g. Orifice diameter, in	1.5
9. Bottom sludge collectors	
a. Type	Chain and flight

b. Number per basin	4 + 1 cross collector
c. Control	Timed interval operation

F. East Flocculators (Retrofitted Accelator Basins, Constructed 2019/2020)

1. Number of basins	2
2. Number of trains per basin	2
3. Rated capacity each, mgd	32.0
4. Total capacity, mgd	64.0
5. Size, each train	
a. Dimensions	51.92’ x 56.17’ x 16’ SWD
b. Volume, gal	335,134
6. Detention time at 32.0 mgd, min	31
7. Stage dimensions	
a. Stage 1	51.92’ x 17’ x 16’ SWD
b. Stage 2	51.92’ x 17’ x 16’ SWD
c. Stage 3	51.92’ x 17’ x 16’ SWD
d. Stage 4 (hydraulic stage)	51.92’ x 5.17’ x 11.92’ SWD
8. Horizontal velocity at 32.0 mgd, ft/min	5.46
9. Mixers	
a. Type	Horizontal shaft paddles-variable speed
b. Shafts per train	3
c. Stages per basin	3 (plus hydraulic stage)
d. Approx. paddle sizes	
1) Stage 1	6” x 14.67’
2) Stage 2	6” x 14.67’
3) Stage 3	6” x 14.67’
4) Stage 4	--
e. Number of paddles per stage	
1) Stage 1	12
2) Stage 2	12
3) Stage 3	8
4) Stage 4	--
f. Motor minimum horsepower, hp	
1) Stage 1	5
2) Stage 2	3
3) Stage 3	2
4) Stage 4	--
g. Shaft speed range, rpm	
1) Stage 1	0-4.00
2) Stage 2	0-3.65
3) Stage 3	0-3.65
4) Stage 4	--
h. Approx. 70 degree Fahrenheit G values at shaft rpm	
1) Stage 1, 1/sec	48 (shaft 3.35 rpm)
2) Stage 2, 1/sec	40 (shaft 3.15 rpm)
3) Stage 3, 1/sec	30 (shaft 3.15 rpm)
4) Stage 4	--
i. Approx. 33 degree Fahrenheit G values at shaft rpm	
1) Stage 1, 1/sec	50 (shaft 4.00 rpm)
2) Stage 2, 1/sec	40 (shaft 3.65 rpm)
3) Stage 3, 1/sec	30 (shaft 3.65 rpm)
4) Stage 4	--
j. Equipment manufacturer	JMS

G. Pretreatment Plate Settlers (Retrofitted Accelator Basins, Constructed 2020)

1.	Number of basins	2
2.	Rated capacity each, mgd	32.0
3.	Total rated capacity, mgd	64.0
4.	Size, each basin	
	a. Dimensions	114’ x 53.83’ x 15.67’ SWD
	b. Volume, gal	711,480
5.	Plate settlers	
	a. Dimensions	10’ x 4.53’
	b. Angle, deg	55
6.	Design plate loading rate, gpm/sq ft	0.34
7.	Design plate efficiency, percent	80%
8.	Min. effective projected horizontal surface area, sq ft	65,851 (per basin)
9.	Sludge collection drive unit horsepower, hp	1/4
10.	Equipment manufacturer	JMS

H. Filters (1-14 constructed 1962 and 15-18 constructed 1992)

1.	Number of filters	18
2.	Type	Dual media with two cells per filter
3.	Dimensions each cell	17’ x 39’
4.	Area each two-cell filter, sf	1,326
5.	Filter underdrains	
	a. Filters 1,2,4,6,8,10,11,12,13,14	Leopold low profile plastic blk, IMS cap
	b. West half of Filter 9	Leopold low profile plastic blk, IMS cap
	c. East half of Filter 9	Clay block with 8” graded gravel
	d. Filters 3,5,7	Clay block with 8” graded gravel
	e. Filters 15,16,17,18	Clay block with 12” graded gravel
6.	Approximate filter media depths (Current standard is 18” sand – 12” anthracite)	
	a. Filter 1	28” sand - 7” anthracite
	b. Filters 2,4,6,8,10,13,14	18” sand - 12” anthracite
	c. West half of Filter 9	18” sand - 12” anthracite
	d. East half of Filter 9	22” sand - 5” anthracite
	e. Filters 11,12	30” sand - 6” anthracite
	f. Filter 3	21” sand - 6” anthracite
	g. Filters 5,7	22” sand - 6” anthracite
	h. Filters 15,16,17,18	30” sand - 8” anthracite
7.	Sand effective size, mm	0.45-0.55 (Current standard)
8.	Anthracite effective sizes, mm	
	a. Filter 1	0.8 - 1.0
	b. Filters 2,4,6,8,10,11,12,13,14	0.95 - 1.05 (Current standard)
	c. West half of Filter 9	0.95 - 1.05
	d. East half of Filter 9	0.45 - 0.8
	e. Filters 3,5,7,15,16,17,18	0.45 - 0.8
9.	Allowable filtration rate (EGLE)	
	a. With all filters in service, gpm/sf	3.9
	b. During filter backwash, gpm/sf	4.2
10.	Total filter rated capacity, mgd	135
11.	Individual filter rate control	Based on level in common influent flume
12.	Filter backwashing (one filter cell at a time)	
	a. Number of backwash pumps	3 (constant speed)
	b. Pump capacities/ motor power	
	1) Backwash Pump 1	18 mgd @ 60’ 250 HP

2) Backwash Pump 2	18 mgd @ 60’	250 HP
3) Backwash Pump 3	21.6 mgd @ 85’	400 HP
c. Water source	Plant reservoirs	
d. Low backwash rate	2,800-3,000 gpm, 4.4 gpm/sf	
e. High backwash rate	12,500 gpm, 18.8 gpm/sf	
f. Backwash flow control	Venturi meters and control valves	
g. Water used/ filter backwash, gal	100,000 average	
13. Filter surface washing		
a. Type	Rotary surface sweeps	
b. Water source	Settled water headers	
c. Number of pumps	2 (constant speed)	
d. Pump capacity/ motor power, each	255 gpm @ 240’ 25 HP	

I. Plant Treated Water Reservoirs

1. Number of Reservoirs	2
2. Type	Ground-level circular welded steel
3. Size, each	
a. Dimensions	240’ dia x 17’ approx height
b. Volume, MG	5.0
4. Typical operating level range, ft	8’ to 15’
5. Overflow level, ft	15.5’
6. Total volume with both in service, MG	10.0
7. Working volume with both in service, MG	5.0

J. High Lift Pumping

1. North High Lift Pumps (Pumps 3-6 were 1939 units moved to plant in 1963. They were replaced in 2019)

a. Number of pumps	5		
b. Pump Type	Vertical centrifugal		
c. Capacities/ motor power			
1) High Lift Pump 3, constant speed (2019)	21 mgd	@ 255’	1250 HP
2) High Lift Pump 4, constant speed (2019)	25 mgd	@ 280’	1500 HP
3) High Lift Pump 5, variable speed (2019)	34.5 mgd	@ 335’	2500 HP
4) High Lift Pump 6, variable speed (2019)	35.5 mgd	@ 335’	2500 HP
5) High Lift Pump 7 (1981, single speed)	50 mgd	@ 300’	3500 HP
d. Discharge			
1) To	North 46” transmission main		
2) Flow metering	Venturi meter		

2. South High Lift Pumps (1992 plant expansion)

a. Number of pumps	5		
b. Pump Type	Two-speed vertical turbines in cans		
c. Capacities/ motor power			
1) High Lift Pump 8	12.5/17 mgd	@185/250’	800/1250 HP
2) High Lift Pump 9	25/33 mgd	@ 225/275’	1800/2500 HP
3) High Lift Pump 10	25/33 mgd	@ 225/275’	1800/2500 HP
4) High Lift Pump 11	12.5/17 mgd	@185/250’	800/1250 HP
5) High Lift Pump 12	25/33 mgd	@ 225/275’	1800/2500 HP
d. Discharge			
1) To	South 60” transmission main		
2) Flow metering	Venturi meter		

K. Sludge Handling

1. Earthen Lagoons

a. Number	2

b. Approx Size, each	700’ x 295’ x 4’
c. Volume of 1’ sludge layer, cu yd	15,300
2. Dry Solids Quantities	
a. Current lb/day	2,109
b. Future 2030 lb/day	2,806
3. Wet Solids Quantities (at 15% by wt)	
a. Current, cu yd/year	4,046
b. Future 2040, cu yd/year	4,780
c. Future storage volume at 1’ depth, yrs	3.2

L. Sodium Hypochlorite Disinfection System (Designed 2013)

1. Material fed	Liquid sodium hypochlorite, 12.5% by weight
2. Type	Chemical feed pumps
3. Variable speed peristaltic metering pumps	
a. Metering Pumps 1 and 2 (pre-chlorination)	
1) Max. capacity, gph	252
2) Max. pressure, psi	110
b. Metering Pump 3 (pre-chlorination)	
1) Max. capacity, gph	23.8
2) Max. pressure, psi	43.5
c. Metering Pumps 4 and 5 (post-chlorination)	
1) Max. capacity, gph	7.9
2) Max. pressure, psi	43.5
4. Magnetic drive transfer pumps	
a. Transfer Pumps 3 and 4 (post-chlorination)	
1) Design flow, gpm	20
2) Design TDH, ft	25
3) Motor horsepower, hp	0.3
4) Max. speed, rpm	N/A
b. Transfer Pumps 1 and 2 (pre-chlorination), and 5 (post-chlorination)	
1) Design flow, gpm	200
2) Design TDH, ft	80
3) Motor horsepower, hp	2.5
4) Max. speed, rpm	3500
5. Storage tanks	
a. Number	5
b. Volume, gal	12,000
c. Diameter, ft	11
d. Shell height, ft	17
e. Pre-chlorination tanks	#1, #2, #3
f. Post-chlorination tanks	#4, #5
6. Day Tank 1 (pre-chlorination)	
a. Volume, gal	12,000
b. Diameter, ft	11
c. Height, ft	17
7. Day Tank 2 (post-chlorination)	
a. Volume, gal	2,000
b. Diameter, ft	7
c. Height, ft	7

8. Chlorine feed points
   a. Either intake crib
   b. Upstream of junction chamber/rising well on north raw water line
   c. Upstream of pretreatment influent chamber on south raw water line

d. East filter influent	
e. West filter influent	
f. North high lift suction	
g. South high lift suction	
h. Auxiliary old high lift suction	
i. Old backwash pipe	
9. Normal chlorine feed point	Prechlorination either upstream of rapid mix or intake crib in warm weather
10. Typical dose range, mg/l	2.0-4.0

M. Alum (50% liquid aluminum sulfate) System

1. Bulk storage tanks	
a. Number	3
b. Type	Rubber-lined steel elevated on legs
c. Capacity each, gallons	11,000
2. Alum day tank	
a. Number	1
b. Type	Rubber-lined steel inside Bulk Tank #2
c. Capacity, gallons	1,500
3. Metering pumps	
a. Total number of pumps	8
b. Number of pumps used	4
c. Manufacturer/model of pumps used	Pulsafeeder model 7440
d. Type	PD diaphragm with remote stroke/speed
e. Capacities, gal/hour	
1) Pumps 1 & 2	128.7 (Typical to Accelators Rap Mix)
2) Pumps 3 & 4	241.2 (Typical to Floc/Seds Rap Mix)
4. Typical dose, mg/l as Al+3	0.7-1.0 (per EGLE)
5. Alum flow metering	Magnetic flow meter ahead of rap mix
6. Automated control	Flow paced dosage control from SCADA

N. Fluoride (23% hydrofluosilicic acid) System

1. Bulk storage tanks	
a. Number	2
b. Type	Rubber-lined steel
c. Capacity each, gallons	6,000
2. Fluoride day tank	
a. Number	1
b. Capacity, gallons	400 (350 usable)
3. Metering pumps	
a. Total number of pumps	2 (1 standby)
b. Manufacturer/model of pumps used	Pulsafeeder model 7120
c. Type	PD diaphragm with remote stroke control
d. Capacities, gal/hour	
1) Pumps 1 & 2	33.75
e. Feed point	Pretreatment Effluent Mixing Chamber
4. Typical dose, mg/l as Fl	1.0-1.1
5. Fluoride flow metering	Magnetic flow meters ahead of feed pt
6. Automated control	Flow paced dosage control from SCADA

O. Phosphate (Blended 50/50 poly-ortho phosphate) System

1. Bulk storage tanks	
a. Number	2

b. Type	Steel (old alum tanks)
c. Capacity each, gallons	8,000 and 5,500
2. Phosphate day tank	
a. Number	1
b. Type	Polyethylene
c. Capacity, gallons	500 (400 usable)
3. Typical dose, mg/l as phosphate	1.8
4. Phosphate flow metering	Magnetic flow meters ahead of feed pts
5. Automated control	Flow paced dosage control from SCADA
6. System deficiencies	Inadequate spill containment
	Corroding bulk tanks with pin holes

P. Powdered Activated Carbon (PAC) System

1. Manual Make-up Slurry Tank	
a. Number	1
b. Type	Hopper-bottom steel
c. Capacity each, gallons	1,250
d. Carbon addition	Manual bag dumping
2. Slurry feeder	
a. Number	1
b. Type	BIF Roto-dip to Accelators
3. Slurry pump	
a. Number	1
b. Type	Watson Marlow peristaltic to Floc/Seds
4. Typical dosage, mg/l	1-5 maximum depending on plant flow
5. Control	Manual settings, no automation/SCADA

Q. Sodium Bisulfite System

1. Purpose	Wastewater dechlorination
2. Chemical supply	55 gallon drums of liquid
3. Day tank capacity, gal	30
4. Metering pumps	
a. Total number of pumps	2
b. Manufacturer of pumps used	Pennwalt
c. Type	PD diaphragm
5. Capacities each pump, gal/hour	36.5 (typically set at maximum rate)
6. Feed point	Filter 16 drain
7. Feed control	Pump operation interlocked with filter backwashing.

R. Ferric Chloride System (Alternate coagulant system not normally in use)

1. Bulk storage tanks	
a. Number	2
b. Type	Rubber-lined steel elevated on legs
c. Capacity each, gallons	13,000
2. Day tank	
a. Number	1
b. Type	Rubber-lined steel inside Bulk Tank #1
c. Capacity, gallons	1,500
3. Metering pumps	
a. Total number of pumps	6
b. Number of pumps used	4
c. Manufacturer/model of pumps used	Chemcon
d. Type	PD diaphragm with remote stroke/speed
e. Capacities, gal/hour	

1) Pumps 1 & 2	40 (Typical to Floc/Seds Rap Mix #2)
2) Pumps 3 & 4	29 (Typical to Accelators Rap Mix #1)
f. Alternate coagulant flow metering	4 magmeters ahead of rapid mixers
g. Automated control	Flow paced dosage control from SCADA

S. Polymer Systems (Not normally in use and in disrepair)

1. Polymer A System Function	Coagulant aid to rapid mixers
a. Bulk Storage tanks	
1) Number	2
2) Type	Steel
3) Capacity each, gallons	2,500
b. Day tank capacity, gal	44
c. Feeders	
1) Number	6
2) Type	Stranco Polyblend
3) Capacity each, gph	4.5
2. Polymer B System Function	Filter aid to pretreatment effluent
a. Bulk Storage tanks	
1) Number	2
2) Type	Steel
3) Capacity each, gallons	2,500
b. Day tank capacity, gal	44
c. Feeders	
1) Number	3
2) Type	Stranco Polyblend
3) Capacity each, gph	4.5

Appendix 1 - Lake Michigan Filtration Plant Condition Summary

Equipment or Treatment Facility	Installation Date/ Last Renovation	Description (capacity, # of units, dimensions)	Make & Model, hp, rpm (480V unless noted otherwise)	Location	Design Service Life / Remaining (yrs)	Observations from 2020 CMP Update
Lake Michigan North Intake 1	1939	Crib 36' x 36' x 10' Timber Reported Capacity 56 MGD	NA	Lake Michigan	50-70/0	Preventative maintenance includes annual inspection of intake, recent inspections have shown no issues. Facility is in good condition. Typically used in winter months only.
Lake Michigan South Intake 2	1992	Crib Diameter 62' x 11' 12 Sided Timber Reported Capacity 111 MGD	NA	Lake Michigan	50-70/22-41	Preventative maintenance includes annual inspection of intake, recent inspections have shown no issues. Facility is in excellent condition. Typically used in summer months only.
North Low Lift Pump Station - Screen	1939	60" square, 7/8" opening size	NA	North Low Lift Pumping Station	50-70/0	Maintained through preventative maintenance program with monthly cleaning. Screens are in good condition. Typically used in winter months only.
North Low Lift Pump Station - Pumps	1939	4 Constant Speed; Vertical Centrifugal Pumps: Pump 1 - 25 mgd, 300 hp Pump 2 - 38.5 mgd, 600 hp Pump 3 - 38.5 mgd, 600 hp Pump 4 - 45 mgd, 700 hp	Pumps 1-3 - Fairbanks Morse; Pump 4 - Worthington-Ideal	North Low Lift Pumping Station	20+/0	Good condition has been maintained through preventative maintenance program. Typically used in winter months only.
South Low Lift Pump Station - Screens	1992	7-'6" x 13'-6"	NA	South Low Lift Pumping Station	50-70/22-461	Maintained through preventative maintenance program with weekly cleaning. Screens are in excellent condition. Typically used in summer months only.
South Low Lift Pump Station - Pumps	1992	Vertical Mixed Flow Pumps, Variable Speed Pump: Pump 5 - 62 mgd, 900 hp; Constant Speed Pumps: Pump 6 - 46.7 mgd, 600 hp Pump 7 - 46.7 mgd, 600 hp	Pumps 5-7 - Byron Jackson-Ideal	South Low Lift Pumping Station	20+/0	Excellent condition. All pumps typically used in summer months only.
Rapid Mixing Facility No. 1	1992	2 Tanks; each tank 11'x11'x15.5' surface water depth (SWD); 14,000 gal per tank; 42.5 sec detention time at 56.8 mgd	NA	Rapid Mixing Facility 1	50-70/27-47	Excellent condition. Area underwent concrete restoration in Winter 2013/2014.
Rapid Mixing Facility No. 1 Mixers	1992	Variable Speed Axial Flow Turbine 1 per tank	Philadelphia 3805Q, 10 hp, 68 rpm	Rapid Mixing Facility 1	20+/0	Maintained through preventative maintenance program. Excellent condition.
Rapid Mixing Facility 2	1992	2 Tanks; each 13.25'x13.25'x15.75' SWD; 20,600 gal per tank; 42 sec detention time at 85.2 mgd	NA	Rapid Mixing Facility 2	50-70/22-41	Excellent condition. Area underwent concrete restoration in Winter 2011/2012.
Rapid Mixing Facility 2 Mixers	1992	Variable Speed Axial Flow Turbine 1 per tank	Philadelphia 3805Q, 15 hp, 84 rpm	Rapid Mixing Facility 2	20+/0	Maintained through preventative maintenance program. Excellent condition.
Flocculation Basins	1992	6 Basins Integral with Sedimentation Basins; Capacity 14.2 mgd each; 85.2 total capacity; each basin 75'x35'x15.5' SWD; each volume 304,342 gal	N/A	Floc/Sed Basins	50-70/22-41	Good condition. Area has underwent numerous phases of concrete restoration from 2006 through 2013.

Equipment or Treatment Facility	Installation Date/ Last Renovation	Description (capacity, # of units, dimensions)	Make & Model, hp, rpm (480V unless noted otherwise)	Location	Design Service Life / Remaining (yrs)	Observations from 2020 CMP Update
Flocculator Mixers	2020	Horizontal Shaft Paddles - Variable Speed; 5 shafts per basin; 3 stages per basin/shaft; Approximate paddle sizes: Stage 1 is 6"x4.5', Stage 2 is 6"x8', Stage 3 is 6"x10'	3 hp for each shaft, speed range - 0-3.61 rpm	Floc/Sed Basins	20+/20	Maintained through preventative maintenance program. Excellent condition.
Sedimentation Basin	1992	6 Basins Integral with Flocculation Basins; Capacity 14.2 mgd each; 85.2 total capacity; each basin 75'x268'x16.5' SWD; each volume 2,480,742 gal	N/A	Floc/Sed Basins	50-70/27-47	Good condition. Area has underwent numerous phases of concrete restoration from 2006 through 2013.
Sedimentation Basin Sludge Collectors	1992	Chain and Flight; 4+1 cross collector; timed interval operation	Envirex. Chains are FRP.	Sludge Collector Drive Gallery	20+/0	Maintained through preventative maintenance program. Excellent condition.
East Pretreatment Flocculators	2020	2 Basins; 2 Trains per Basin; Capacity 32.0 mgd each; Total capacity 64.0 mgd; each train 51.92'x56.17'x16' SWD; each train volume 335,134 gal; Horizontal Shaft Paddles - Variable Speed; 3 shafts per train; 1 stage per shaft; Approximate paddle sizes (all stages): 6"x14.67'	JMS Flocculators variable speed, Stage 1 - 5 hp, Stage 2 - 3 hp, Stage 3 - 2 hp	Old Accelator Building	50-70/50-70	Pretreatment flocculators are currently under construction and are being retrofitted into the old West Accelator basins.
East Pretreatment Plate Settlers	2020	2 Basins; Capacity 32.0 mgd each; Total capacity 64.0 mgd; each basin 114'x53.83'x15.67' SWD; each volume 711,480 gal; Plate settlers 10'x4.53', 55 deg angle	JMS Plate Settlers variable speed sludge scraper 1/4 hp	Old Accelator Building	50-70/50-70	Pretreatment plate settlers are currently under construction and are being retrofitted into the old West Accelator basins.
Filters 1-14	1962	Dual Media with 2 cells per filter 17'x39' each cell; Area of 1,326 sf per filter	All filters have Leopold HDPE underdrains with media retention caps.	Filter Building	50-70/0-2	All filters have undergone rehabilitation and concrete restoration as of 2015.
Filters 15-18	1992	Dual Media with 2 cells per filter 17'x39' each cell; Area of 1,326 sf per filter	Filter Underdrains Clay block with 12" graded gravel.	Filter Building	50-70/22-41	Excellent condition.
Filter Backwash Pumps	1962; 1992	3 Constant Speed Pumps	Pumps 1 and 2 (1962) - 18 mgd @ 60', 250 hp Pump 3 (1992) - 21.6 mgd @ 85', 400 hp	Filter Building	20+/0	Pump #2 motor was rebuilt in 2015. Maintained through preventative maintenance program. Pumps are in excellent to good condition.
Filter Surface Wash	1962	Rotary Surface Sweeps	2 Constant Speed Pumps each 255 gpm @ 240', 25 hp	Filter Building	20+/0	Good condition.
North Clearwell	1962/2019	Ground-level circular welded steel	240' dia x 17' approx height, 5 mgal	Reservoir	25/25	Tank are maintained through test inspections by tank supplier/repair companies. Tank underwent internal/external rehabilitation in 2019. No replacement planned for near term.

Equipment or Treatment Facility	Installation Date/ Last Renovation	Description (capacity, # of units, dimensions)	Make & Model, hp, rpm (480V unless noted otherwise)	Location	Design Service Life / Remaining (yrs)	Observations from 2020 CMP Update
South Clearwell	1982	Ground-level circular welded steel	240' dia x 17' approx height, 5 mgal	Reservoir	25/0	Tank are maintained through test inspections by tank supplier/repair companies. Tank underwent internal rehabilitation to repair beams and purlins in 2013-2014. The interior walls and floors are scheduled to be repainted in 2020. No replacement planned for near term.
High Lift Pumping - Old High Lift Pumps 3-6	2019	4 Constant Speed Vertical Centrifugals; Pump 3 - 21 mgd, 1250 hp Pump 4 - 25 mgd, 1500 hp Pump 5 - 34.5 mgd, 2500 hp Pump 6 - 35.5 mgd, 2500 hp	Flowserve-Hyundai/Ideal	High Lift Pump Station No. 1	20+/20	Pumps, motors, and intermediate shafting were replaced in 2019. Pumps are maintained through preventative maintenance program. Pumps are in excellent condition.
High Lift Pumping - Old High Lift Pump 7	1981	Constant Speed Vertical Centrifugal Pump 7 - 50 mgd, 3500 hp	Worthington-Ideal	High Lift Pump Station No. 1	20+/0	The starter for this pump was removed in 2019. The pump is no longer operable.
High Lift Pumping - New High Lift Pumps 8-12	1992	5 Two Speed Vertical Turbines; Pump 8 and 11-12.5/17 mgd, 800/1250 hp; Pump 9, 10, 12 - 25/33 mgd, 1800/2500 hp	Peerless-Ideal	High Lift Pump Station No. 2	20+/0	Excellent condition.
Sludge Handling	1962	2 Earthen Lagoons; each 700'x295'x4'; Sludge Drain Dewatering Pumps	NA	South of Floc/Sed Basins	50-70/0-8	Study underway considering possible residuals handling upgrades. Study is considering potential reuse of Accelator Building for residuals purposes.
Sodium Hypochlorite System	2014	Liquid Sodium Hypochlorite (Pre and Post Systems)	Watson Marlow - Bradel Peristaltic Pumps	Old Polymer and Ferric Rooms	20+/14	System was repaired after accidental chlorine release in Summer 2015.
Alum System	1992; 2001	3 Bulk Storage Tanks, 1 day tank, 8 Metering Pumps	Pulsafeeder model 7440	Alum System	20+/0	Tanks are in good condition. Pulsafeeder Pumps are a 2001 upgrade, excellent condition.
Fluoride System	1992; 2001	2 Bulk Storage Tanks, 1 day tank, 2 Metering Pumps	Pulsafeeder model 7120	Fluoride Room	20+/0	Tanks are in good condition. Pulsafeeder Pumps are a 2001 upgrade, excellent condition.
Phosphate System	1962	2 Bulk Storage Tanks, 1 day tank	storage tanks are the old steel alum tanks	Phosphate Area	20+/0	System has inadequate spill containment and corroding bulk tanks with pin holes. Recoating/relining of tanks is likely within next 5 years.
Powdered Activated Carbon (PAC) System	1962	Manual Make-Up Slurry Tank, Slurry Feeder, Slurry pump	Watson Marlow peristaltic pump & Rotodip equipment	Powdered Activated Carbon (PAC) System	20+/0	Parts are becoming obsolete on 1962 vintage rotodip equipment. Maintaining reliable operation is difficult.
Potassium Permanganate System	1992	2 Manual Make-Up Solution Tanks, 4 metering pumps	Chemcon metering pumps	Potassium Permanganate System	20+/0	Currently this equipment is not used.
HVAC System	2015	Separate systems includes Admin Building Laboratory, Floc/Sed basins, Accelators (old), Control Room	Various	Throughout LMFP	15-30/10-25	Much of air conditioning and heating equipment throughout the plant was replaced in 2015 and 2016.

City of Grand Rapids

2020 DWRF Project Plan

City of Grand Rapids Distribution System

Project 190666

Summary of Distribution System Facilities

A. Distribution System

1. Table A-1 summarizes pipe sizes in the system.

Table No. A-1 – Distribution System Pipe Diameter Summary

Pipe Diameter (inches)	Total Pipe Length (feet)	Percent of Water System Piping
4	108,049	1.6%
6	2,453,876	36.1%
8	1,388,328	20.4%
10	61,950	0.9%
12	1,397,140	20.6%
14	13	0.0%
16	655,138	9.6%
18	2,626	0.0%
20	21,382	0.3%
24	195,679	2.9%
30	80,458	1.2%
36	61,832	0.9%
42	12,600	0.2%
46	160,800	2.4%
48	18,819	0.3%
54	6,780	0.1%
60	165,972	2.4%
Total	6,791,442	100.0%

Taken from GIS (updated in 2018) and Hydraulic Model Databases

2. Pipe condition varies throughout the system. Pipes are replaced in conjunction with other road and utility work. Table A-2 summarizes the estimated percentage of each type of pipe material to total piping in the system. Table A-3 summarizes the estimated age of the pipes in the system.

Table No. A-2 – Distribution System Pipe Material Summary

Pipe Material	Percent of Water System Piping
Cast Iron	3.69%
Concrete	1.02%
Ductile Iron	54.3%
Plastic	0.01%
Steel	0.11%
Unknown	40.8%
Total	100.0%

Taken from GIS (updated in 2018)

Table No. A-3 – Distribution System Pipe Age Summary

Pipe Age (years)	Percent of Water System Piping
100+	6.6%
90 - 99	5.9%
80 - 89	2.2%
70 - 79	1.7%
60 - 69	4.0%
50 - 59	11.2%
40 - 49	9.3%
30 - 39	10.1%
20 - 29	17.6%
10 - 19	19.4%
0 - 9	6.8%
Unknown	5.1%
Total	100.0%

Taken from GIS (updated in 2018)

3. The condition of valves in the distribution system varies throughout the system. Valves are replaced in conjunction with other road and utility work. Table A-4 summarizes the valve sizes in the system. Table A-5 summarizes the estimated age of the valves in the system.

Table No. A-4 – Distribution System Valve Size Summary

Valve Age (years)	Percent of All Valves
4	5.04%
6	62.15%
8	16.52%
10	0.52%
12	10.68%
16	2.90%
18	0.01%
20	0.15%
24	0.57%
30	0.29%
36	0.13%
42	0.08%
46	0.01%
48	0.04%
50	0.01%
54	0.01%
60	0.08%
66	0.01%
84	0.01%
Unknown	0.77%
Total	100.0%

Taken from GIS (updated in 2018)

Table No. A-5 – Distribution System Valve Age Summary

Valve Age (years)	Percent of All Valves
100+	4.2%
90 - 99	5.5%
80 - 89	1.4%
70 - 79	1.4%
60 - 69	3.7%
50 - 59	10.9%
40 - 49	9.2%
30 - 39	10.4%
20 - 29	17.8%
10 - 19	19.0%
0 - 9	6.2%
Unknown	10.5%
Total	100.0%

Taken from GIS (updated in 2018)

4. Table A-6 summarizes the estimated age of the hydrants in the system.

Table No. A-6 – Distribution System Hydrant Age Summary

Hydrant Age (years)	Percent of All Hydrants
100+	4.0%
90 - 99	5.6%
80 - 89	1.3%
70 - 79	1.4%
60 - 69	4.1%
50 - 59	13.0%
40 - 49	11.2%
30 - 39	12.6%
20 - 29	17.7%
10 - 19	16.5%
0 - 9	5.3%
Unknown	7.5%
Total	100.0%

Taken from GIS (updated in 2018)

5. Table A-7 summarizes the estimated age of the service lines in the system. Note, the data is taken from the assumed install date in the GIS database. Some data may be inaccurate.

Table No. A-7 – Distribution System Service Line Age Summary

Service Line Age (years)	Percent of All Services
100+	2.8%
90 - 99	3.1%
80 - 89	0.6%
70 - 79	1.0%
60 - 69	1.5%
50 - 59	3.9%
40 - 49	4.8%
30 - 39	5.3%
20 - 29	7.8%
10 - 19	35.3%
0 - 9	29.7%
Unknown	4.2%
Total	100.0%

Taken from GIS (updated in 2018)

B. Water Storage Facilities
   1. Wilson Reservoir
      a. Volume 5.0 MG
      b. Built 1971
   2. Leonard Elevated Storage Tank
      a. Volume 1.0 MG
      b. Built 1965
   3. Burton Reservoir
      a. Volume 5.0 MG
      b. Built 1989
   4. Covell Reservoir
      a. Volume: 8.0 MG
      b. Built: 1939
   5. Livingston Reservoir
      a. Volume: 16.0 MG
      b. Built: 1939
   6. Franklin Reservoir
      a. Volume: 16.0 MG
      b. Built 1938
   7. Monroe Reservoir
      a. Volume 5.0 MG (used minimally ~ 1 MG to keep tank fresh)
      b. Built 1986
   8. Tulip Elevated Storage Tank
      a. Volume 1.25 MG
      b. Built 1960
   9. Alger Reservoir
      a. Volume 5.0 MG
      b. Built 1972
   10. Knapp Elevated Storage Tank
      a. Volume 1.25 MG

b. Built 1956
11. Cambridge Elevated Storage Tank
    a. Volume 1.25 MG
    b. Built 1956
12. Dean Lake Service Center
    a. Volume 5.0 MG
    b. Built 1987
13. East Paris Service Center
    a. Volume 5.0 MG
    b. Built 1978
14. East Grand Rapids Elevated Tank
    a. Volume 1.25 MG
    b. Built 1959
15. Ada Township Elevated Storage Tank
    a. Volume 1.0 MG
    b. Built 1980
16. Patterson Elevated Storage Tank
    a. Volume 1.5 MG
    b. Built 2013
17. North Walker Elevated Storage Tank
    a. Volume 0.5 MG
    b. Built 2017

C. Water Pumping Facilities – See Attached Data Sheets
1. Wilson Reservoir
2. Bristol Booster Pump Station
3. Burton Reservoir
4. Covell Reservoir
5. Livingston Reservoir
6. Franklin Reservoir
7. Coldbrook Pumping Station
8. Booster A
9. Booster D
10. Alger Reservoir
11. Dean Lake Service Center
12. East Paris Service Center
13. Ada Booster Pump Station
14. Allendale / South Walker Booster Pump Station

Appendix 1. Grand Rapids Distribution System Summary of Pumps

Pump Station Description	Pump No.	Pump Center Line Elevation	Head (feet)	Pressure (psi)	Capacity		Pumps				Motors						
					(gpm)	(mgd)	Make	Model	Year Installed	Serial No.	Make	Type	HP	Speed	Serial No.	Voltage	Ampere
Lake Low Lift	1	562.90	53.4	23	17,360	25.0	F-M	24" 5710	1963	798761	F-M	SYNC	300	600	B6247	2400/4160	58/33.4
	2	562.90	60	26	26,750	38.6	F-M	30" 5713	1963	798685	F-M	SYNC	600	400	B6265	2400/4160	114.2/66
	3	562.90	60	26	26,750	38.6	F-M	30" 6713	1963	798686	F-M	SYNC	600	400	B6264	2400/4160	114.2/66
	4	563.00	71	31	31,250	45.0	Worth	30 MNZ 43	1985	86ZUS8384-1	Ideal	SYNC	700	450	334338	2300	137
	5	596.17	55	24	43,000	62.0	BYR-JCK	48 VX-1	1991	891-C-0483	Ideal	SMVB	900	600	350762	2300	1771
	6	596.17	53	23	32,400	47.0	BYR-JCK	42 VX-1	1991	891-C-0484	Ideal	SMVB	600	720	350751&753	2300	116
	7	596.17	53	23	32,400	47.0	BYR-JCK	42 VX-1	1991	891-C-0485	Ideal	SMVB	600	720	350752&754	2300	116
Lake High Lift	3	579.96	255	110	14,600	21.0	Flowserve	20 NA-37	2019	1806MT008011	Hyundai	INDC	1250	890	20171748RMH597001	4160	172.4
	4	579.96	280	121	17,400	25.1	Flowserve	24 NA-37	2019	1903MT000812-1	Hyundai	INDC	1500	892	20171748RMH598001	4160	206.3
	5	579.96	335	145	23,958	34.5	Flowserve	30 NA-40	2019	1806MT000813-1	Hyundai	INDC	2500	888	20171748RMH599001	4160	339.9
	6	579.96	335	145	24,653	35.5	Flowserve	30 NA-40	2019	1901MT000823-1	Hyundai	INDC	2500	888	20171748RMHB27001	4160	339.9
	8	608.42	404	175	8,675	12.5	Peer	30LA-4STG	1992	258341	Ideal	INDC	1250/800	891/711	901056-01	4000	179/115
	9	608.42	404	175	17,350	25.0	Peer	36HXB-5STG	1992	258338	Ideal	INDC	2500/1736	716/596	901057-01	4000	395/276
	10	608.42	404	175	17,350	25.0	Peer	36HXB-5STG	1992	258339	Ideal	INDC	2500/1736	716/596	901057-02	4000	395/276
	11	608.42	404	175	8,675	12.5	Peer	30LA-4STG	1992	258342	Ideal	INDC	1250/800	891/711	901056-02	4000	179/115
	12	608.42	404	175	17,350	25.0	Peer	36HXB5	1992	258340	Ideal	INDC	2500/1736	716/596	901057-03	4000	395/276
Ada	1	768.00	50	22	1,500	2.2	ITT-AC	8x8x12 8100	2004	04-552181-01-01	G.E.	INDC	30	1170		230/460	71.6/35.8
	2	768.00	50	22	1,500	2.2	ITT-AC	8x8x12 8100	2004	04-552181-01-02	G.E.	INDC	30	1170		230/460	71.6/35.8
	3	768.00	63	27	1,200	1.7	ITT-AC	8x6x12XL 8100	1998	98-246289-01-01	U.S. M	INDC	25	1170		460	
Allendale	2	638.00	210	91	14,600	21.0	Worth	20 LCS-3	1940	997647	West	SYNC	900	900	1S1OP15	2300	176.5
	3	638.25	225	97	17,400	25.0	Worth	20 LCS-4	1940	997648	West	SYNC	1200	720	1S1OP17	2300	235
	4	638.25	240	102	21,550	31.0	Worth	20 LCS-4	1940	997649	West	SYNC	1500	720	1S1OP19	2300	293
	5	638.00	250	108	21,700	31.3	Worth	20 LCS-4	1949	1346734	West	SYNC	1750	720	1S37P74	2300	342
Burton Booster	1	726.17	66	28	53,500	77.0	Patter	42x36 MAD	1992	9OPT14164A36	Ideal	INDC	1250	507	901020-01	2300	314/362
	2	726.17	66	28	53,500	77.0	Patter	42x36 MAD	1992	9OPT14165A36	Ideal	INDC	1250	507	901019-01	2300	314/362
Coldbrook	1	607.54	175	76	17,360	25.0	Worth	18 LA-2	1956	1508244	E-M	SYNC	900	1200	1K101411	2400/4160	168/97
	2	608.62	115	50	6,042	8.7	Patter	14x12 MAB	2014	SC-C0119716	G.E.	INDC	250	1190	JGFT253U016	460	287
	3	608.29	175	76	17,350	25.0	Worth	20 LN-28	1981	79Z002003-1	G.E.	SYNC	1000	900	HS8416409	2300	193.8
	4	608.54	280	121	10,400	15.0	A-C	08-107-382-513	1980	812-8101	A-C	INDC	1000	1185	75115-09588-1-1	2300	221
	5	608.54	290	126	17,350	25.0	Worth	16 LN-35	1981	79Z002004-1	G.E.	SYNC	1750	900	HS8416410	2300	336
	6	602.29	240	104	700	1.0	Patter	5x3 MAC	2014	C002837-01	U.S. M	INDC	60	3565	Z03Y1990883R-1	460	68
Booster "A"	1	698.62	230	100	2,780	4.0	Day D	100 SLH	1940	40260	Burk	INDC	100	1775	154268	480	109
	2	698.62	75	33	700	1.0	A-C	6x4x11	1992	1-74019-02-1	G.E.	INDC	20	1770	SEKOA035D47	230/460	48.6/24.3
	3	698.62	80	35	1,400	2.2	Peer	6AE11	1992	470534	Reli	INDC	40	1775	1MAF62758CIVS	230/460	98.6/49.3
Booster "D"	1	619.57	150	65	4,860	7.0	Worth	10 LN-22	1974	73Z000728-1	West	INDC	250	1175	1S-73	460	291
	2	619.54	102	44	3,958	5.7	Worth	10 R-15	1977	Y571904	U.S. M	INDC	125	1775	R945602177	460	150
	3	619.55	95	41	2,400	3.5	A-C	10x8x12S	1992	1-64983-01-1	G.E.	INDC	75	1785	VF6341232	460	86.5

Pump Station Description	Pump No.	Pump Center Line Elevation	Head (feet)	Pressure (psi)	Capacity		Pumps				Motors						
					(gpm)	(mgd)	Make	Model	Year Installed	Serial No.	Make	Type	HP	Speed	Serial No.	Voltage	Ampere
Alger	1	647.58	100	43	1,050	1.5	Aurora	411 5x6x11A	2019	18-2550925	U.S. M	INDC	40	1775	1315412-100	230/460	91/46
	2	647.58	110	48	2,100	3.0	Aurora	411 8x10x17B	2019	19-2551056	U.S. M	INDC	100	1180	1322012-100	230/460	117/59
	3	659.58	185	80	700	1.0	Aurora	412 3x4x10C	2019		U.S. M	INDC	50	3565	1315434-100	230/460	113/57
	4	659.58	185	80	2,100	3.0	Aurora	412 6x8x15	2019	19-2550922	U.S. M	INDC	150	1775	1315433-100	230/460	335/168
Bristol	1	775.88	70	30	1,736	2.5	Aurora	411 8x10x15A	2018		U.S. M	INDC	40	1180		230/460	92/46
	2	775.88	70	30	1,736	2.5	Aurora	411 8x10x15A	2018		U.S. M	INDC	40	1180		230/460	92/46
	3	775.88	49.5	21	694	1.0	Aurora	411 5x6x11A	2018		U.S. M	INDC	15	1180		230/460	37/18.5
Covell	1 (N)	747.63	155	67	4,164	6.0	Worth	10 LN-22	1982	81Z002355-1	West	INDC	200	1180	8201	460	236
	2 (S)	747.29	142	62	3,472	5.0	E-P	10x8 M	1954	A8-82118	Tosh	INDC	150	1785	92203383	230/460	334/167
	3 (V-3)	744.62	150	65	2,430	3.5	A-C	10x8x17	1970	1-94540-1-1	F-M	INDC	125	1775	502787R1	460	131
Dean Lake	1	768.00	170	74	700	1.0	Aurora	413 4x5x15	2012		U.S. M	INDC	50	1775	21246	460	59
	2	768.33	162	70	2,800	4.0	Worth	8 LN-21	1987	Z002970	Reli	INDC	200	1185	1MQF26372-GI-WM	460	229
	3	768.50	65	28	5,125	7.4	Aurora	411 12x14x15B	2012		U.S. M	INDC	100	1185		460	121
	4	768.50	65	28	5125	7.4	Aurora	411 12x14x15B	2012		U.S. M	INDC	100	1185		460	121
East Paris	1	735.22	180	78	5,000	7.2	Patter	14x12 MAB	2015	SC-C0114558-01	G.E.	INDC	350	1200		460	395
	2	735.22	180	78	5,000	7.2	Patter	14x12 MAB	2015	SC-C0114558-02	G.E.	INDC	350	1200		460	395
	3	735.22	180	78	5,000	7.2	Patter	14x12 MAB	2015	SC-C0114559-01	G.E.	INDC	350	1200		460	395
	4	735.22	180	78	5,000	7.2	Patter	14x12 MAB	2015	SC-C0114559-02	G.E.	INDC	350	1200		460	395
Franklin	1	747.28	200	87	6,930	10.0	Worth	12 FAS-2	1956	1519650	F-M	INDC	450	1175	502787R1	440	520
	2	748.63	220	95	9,720	14.0	Worth	18 NA-25	1940	997461	West	SYNC	700	1200	1S10P3	440	720
	3	747.17	175	76	4,160	6.0	Worth	12 FAS-2	1956	1520329	Elli	INDC	250	1180	CS3034-1	440/480	295
	4 Alt	744.76	200	87	11,104	16.0	A-C	250	1982	811-37187-3-1	Det. D	DIESEL	600	1415	663941		
	5	746.25	220	95	5,500	8.0	Patter	MABS-C 18x14	1995		G.E.	INDC	450	1190	RNG142002	460	511
	6	745.98	220	95	8,300	12.0	ITT-AC	WSHD 18x16	1995	40010201	G.E.	INDC	600	1185	PNG134002	460	676
	7	745.98	75	32	8,000	11.5	ITT-AC	WSHD 18x16	1995	40010301	G.E.	INDC	200	1185	PNG131002	460	241
	8	745.98	75	32	8,000	11.5	ITT-AC	WSHD 18x16	1995	40010302	G.E.	INDC	200	1185	PNG131001	460	241
	9	745.98	75	32	8,000	11.5	ITT-AC	WSHD 18x16	1995	40010303	G.E.	INDC	200	1185	PNG131003	460	241
Livingston	1	739.17	184	80	2,080	3.0	Whelr		1956	A6-22121	E-D	INDC	125	1760	AJ4462A2	220/440	300/150
	2	738.88	220	95	3,480	5.0	Whelr	M 10X8	1956	A822120-1	E-D	INDC	250	1760	AJ4006A1	440	290
	3	739.17	220	95	3,480	5.0	Whelr	M 10X8	1956	A822120-2	E-D	INDC	250	1760	AJ4006A2	440	290
	4	740.18	220	95	6,950	10.0	De Lav	P 14/12	1964	702500	Ideal	SYNC	450	1200	250061	440	466
	5	738.88	220	95	4,164	6.0	Warren	10-DLB-25-200	1982	80282	West	INDC	350	1178	1S8210	460	404
	V-5 Alt	738.88	220	95	6,940	10.0	Warren	10-DLB-25-200	1982	80282	Cumm. D.	DIESEL	620	1800	37105971		
South Walker	3	723.70	90	39	700	1.0	Patter	S4B11A-1	2010	HV-C103766-1-01	Baldor	INDC	25	1770	C1105060503	230/460	60/30
	4	723.70	90	39	700	1.0	Patter	S4B11A-1	2010	HV-C103766-1-02	Baldor	INDC	25	1770	C1105060508	230/460	60/30
Wilson	1	726.27	170	74	4,166	6.0	Aurora	411 10x12x15C	2015	2429594	Baldor	INDC	250	1785		460	275
	2	727.21	170	74	7,600	11.0	A-C	150	1940	781-27407-1-1	G.E.	INDC	400	1175	EP8409538	2300	93
	3	726.92	200	87	9,730	14.0	Worth	18 LC-3	1940	997646	Tosh	INDC	600	1165	7610807	2300/4160	144/2

Appendix 2

Cultural Resources

In order to identify sites of historical and cultural significance, the City of Grand Rapids *Historic Districts and Landmark Map*, the National Register of Historic Places, the National Archives, and the State's Register of Historic Sites were reviewed. Pictures of structures greater than 50 years old within the limits of the proposed project will be submitted for a Part 106 review to SHPO, and THPO's will be contacted for an opportunity to comment on the proposed project.

Cultural Resources Near Project Areas

Project	Property Name	Address	Database	Distance to Project
Page, Carrier, Lister, and Plainfield Improvements Project	Maurice Shanahan House	1330 Plainfield Avenue	Michigan State Historic Sites in Kent County	Within project limits
Private Lead Service Line Replacement	Central Furniture Company – H.E. Shaw Furniture Company Factory	400 Ionia Ave SW	National Register of Historic Places	Northwestern edge of project limits
	Ford, President Gerald R., Jr., Boyhood Home	649 Union Ave SE	National Register of Historic Places	Within project limits
	Grand Rapids Christian High School	415 Franklin St SE	National Register of Historic Places	Within project limits
	Heartside Historic District	Multiple	National Register of Historic Places/ City of Grand Rapids *Historic Districts and Landmark Map*	Northwestern edge of project limits
	Heritage Hill Historic District	Multiple	National Register of Historic Places/ City of Grand Rapids *Historic Districts and Landmark Map*	Within project limits
	Cherry Hill Historic District	Multiple	City of Grand Rapids *Historic Districts and Landmark Map*	Within project limits
	Wealthy Theatre Historic District	Multiple	City of Grand Rapids *Historic Districts and Landmark Map*	Within project limits

Cultural Resources Near Project Areas

Project	Property Name	Address	Database	Distance to Project
Private Lead Service Line Replacement	St. Andrew's Cemetery	Property bounded by Prince St and Delaware St to the north and south and Madison Ave and Union St to the east and west	National Archives	Within project limits
	May House	450 Madison SE	Michigan Historic Markers	Within project limits
	Paul H Richens House	427 James Ave SE	Michigan Historic Markers	Within project limits
Plainfield Avenue Water Main Project	2420 Plainfield Ave NE	Michigan Historic Markers	Within project limits	

The Natural Environment

Environmental Impacts Near Project Areas

Project	Climate[1]	Air Quality[2]	Wetlands (Map 3)	Coastal Zones	Floodplains (Map 4)	Natural or Wild and Scenic Rivers	Major Surface Waters (Map 2)	Agricultural Resources (Map 5)	Existing Plant/Animal Communities and Environmentally Sensitive Habitats (Map 6)
LMFP Residuals Handling Improvements		X							
Franklin Street Pump Station Pump Replacement		X							
College Avenue Water Main		X							
Straight Avenue SW and Wealthy Street SW Water Main		X	O		O		O	O	
Page, Carrier, Lister, and Plainfield Improvements		X							
Private Lead Service Line Replacement		X							
Giddings Avenue Water Main		X							
Eleanor Street Water Main		X							
Plainfield Avenue Water Main		X							
Garfield Avenue Water Main		X			O				

X = Effect

O = In vicinity to the project, but no anticipated impact

[1] Where applicable, construction will occur during the typical construction season for underground work.

[2] Air quality will be temporarily impacted due to the exhaust of the heavy machinery required for demolition and construction.

Contamination

The EGLE Environmental Mapper, found at www.mcgi.state.mi.us/environmentalmapper/, was reviewed to find Part 201 Sites or Leaking Underground Storage Tanks (LUSTs) located near the project area.

Past projects within the City have encountered contaminated soils within the road right-of-way. Any soil borings taken during preliminary design will be tested. During construction, onsite inspectors will take soil samples if contaminated soils are encountered. Contaminated soils will be removed and disposed of in accordance with all state and federal regulations.

Part 201 Sites Near Project Areas

Project	Site ID	Site Name	Address	Contaminants	Location Description
Collge Avenue Water Main	41002313	1217 College Avenue NE and 456 Carrier S	1217 College Ave NE and 456 Carrier St NE	Not Indicated	Within project limits
	41001260	1425 Coit Avenue NE	1425 Coit Avenue NE Grand Rapids	Not Indicated	1,985 feet west of project
	41001253	1330 1318 Plainfield Avenue NE	1330 1318 Plainfield Ave NE	Not Indicated	2,230 feet west of project
	41001042	201 Matilda Street NE	201 Matilda St NE Grand Rapids 49503	1,2,4 TMB As Benzene Benzo(a)pyrene Ethylbenzene Pb	2,660 feet southwest of project
	41000728	A&M Petroleum (Former)	1160/1162 Plainfield Ave NE Grand Rapids 49503	Benzene Ethylbenzene Fluoranthene Fluorene Fe Pb Mn Phenanthrene Toluene Xylenes PNAs	2,750 feet southwest of project
Straight Avenue SW and Wealthy Street SW	41001268	1001 Fulton St West	1001 Fulton St West Grand Rapids	Not Indicated	2,000 feet northwest of project
	41001088	601 West LLC	601, 615 & 621 Lake Michigan Dr NW and 134, 140 & 144 Lexington Ave NW Grand Rapids	Not Indicated	2,765 feet northeast of project
	41001118	310 Pearl St	310 Pearl Street Grand Rapids 49504	VC	3,385 northeast of project
	41001079	Lexington School Property Project	45 Lexington Ave NW Grand Rapids 49504	Not Indicated	2,120 feet northeast of project
	41001033	417 Watson	417 Watson Grand Rapids 49504	1,1,1 TCA 1,1 DCA 1,2,4 TMB 1,2 DCB 1,3,5 TMB As	2,170 feet northeast of project
	41001134	Fulton and Seward	Lexington and West Fulton St SW Grand Rapids	Not Indicated	1,675 feet northeast of project
	41001249	839 Butterworth St SW	839 Butterworth Street SW Grand Rapids	Not Indicated	2,135 feet northwest of project
	41001236	201 Tolford Ave SW	201Tolford Ave SW Grand Rapids	Not Indicated	1,145 feet northeast of project
	41001235	648 650 Butterworth St SW	648 650 Butterworth St SW Grand Rapids	Not Indicated	905 feet east of project
	41000988	240 & 300 Front Ave	240 & 300 Front Ave Grand Rapids	Not Indicated	1,360 feet east of project
	41001052	818 Butterworth St SW	818 Butterworth St SW Grand Rapids 49504	Pb	480 feet west of project
	41000001	Able Finishing Company	343 Straight St SW Grand Rapids 49594	Cr+3 Pb Mn Heavy mfg	Within project limits
	41000954	Applied Arts Corporation	365 Lane SW Grand Rapids 49504	Not Indicated	1,325 feet west of project
	41001072	977 Wealthy Street SW	977 Wealthy Street SW Grand Rapids	FE TCE Cis-1,2, DCE	1,325 feet west of project
	41000962	Wealthy Street Extension	850-1150 Wealthy Street SW Grand Rapids 49503	As Benzo(a)pyrene Cr+3 Pb	1,325 feet west of project
	41000989	Consumers Energy-Transmission Station	Wealthy Street SW Grand Rapids 49504	As Benzo(a)pyrene Naphthalene Zn	1,000 feet west of project

Part 201 Sites Near Project Areas

Project	Site ID	Site Name	Address	Contaminants	Location Description
Page, Carrier, Lister, and Plainfield Improvements	41001253	1330 1318 Plainfield Ave NE	1330 1318 Plainfield Ave NE Grand Rapids	Not Indicated	Within Project Limits
	41001288	1661 Monroe Ave NW	1661 Monroe Ave NW Grand Rapids	Not Indicated	2,915 feet northwest of project
	41000940	Lacks Industries – Plastic Plate 1	1648 Monroe Ave NW Grand Rapids 49505	Cl Cr+3 CN	2,425 feet northwest of project
	41002304	1 Colfax Street NE	1 Colfax Street NE Grand Rapids	Not Indicated	1,470 feet northwest of project
	41001260	1425 Coit Ave NE	1425 Coit Ave NE Grand Rapids	Not Indicated	740 feet northeast of project
	41001276	1035 1529 Monroe Ave NW	1035 1529 Monroe Ave NW Grand Rapids	Not Indicated	1,225 feet west of project
	41001081	1200 Monroe Ave NW	1200 Monroe Ave NW Grand Rapids 49505	Not Indicated	840 feet west of project
	41002313	1217 College Ave NE 456 Carrier St NE	1217 College Ave NE 456 Carrier St NE Grand Rapids	Not Indicated	2,660 feet east of project
	41001277	1021 Ottawa Ave NW	1021 Ottawa Ave NW 1002 1012 Monroe NW Split Grand Rapids	Not Indicated	1,540 feet southwest of project
	41001026	801 Ionia Ave NW	801 Ionia Ave NW Grand Rapids 49503	Not Indicated	2,700 feet southwest of project
	41001042	201 Matilda St NE	201 Matilda St NE Grand Rapids 49503	1,2,4 TMB As Benzene Benzo(a)pyrene Ethylbenzene Pb	2,000 feet southeast of project
	41000728	A&M Petroleum (Former)	1160/1162 Plainfield Ave NE Grand Rapids 49503	Benzene Ethylbenzene Fluoranthene Fluorene Fe Pb Mn Phenanthrene Toluene Xylenes PNAs	325 feet south of project
Private Lead Service Line Replacement	41001218	56 Grandville Ave SW	56 Grandville Ave SW between Weston St and Oakes St Grand Rapids 49503	Not Indicated	2,500 feet northwest of project
	41001039	72 Grandville Ave SW	72 Grandville Ave SW Grand Rapids 49503	1,1,2 TCA 1,1 DCE As Benzene PCE TCE Trans-1,2 DCE	2,500 feet northwest of project
	41001208	248 Williams St	248 Williams St SW Grand Rapids	Not Indicated	2,330 feet northwest of project
	41000112	Detrex Corporation	312 Ellsworth SW Grand Rapids 49503	TCE	1,500 feet northwest of project
	41002311	1 Ionia Ave SW	1 Ionia Ave SW Grand Rapids	Not Indicated	2,660 feet northwest of project
	41001150	47 Commerce SW	47 Commerce SW Grand Rapids	Not Indicated	2,190 feet northwest of project
	41001267	61 Commerce Ave SW	61 Commerce Ave SW Grand Rapids	Not Indicated	2,180 feet northwest of project
	41001086	205 South Division Ave	205 South Division Ave aka 26 Cherry St Grand Rapids	Not Indicated	1,260 feet northwest of project
	41000990	104 106 120 122 & 126-134 S Division Ave	104 106 120 122 & 126-134 S Division Ave Grand Rapids 49503	Not Indicated	1,515 feet north of project
	41001028	121 Sheldon Ave SE	121 Sheldon Ave SE Grand Rapids 49503	As Benzo(a)pyrene Pb PCE	1,515 feet north of project

Part 201 Sites Near Project Areas

Project	Site ID	Site Name	Address	Contaminants	Location Description
Private Lead Service Line Replacement	41001273	143 Cherry St SE	143 Cherry St SE Grand Rapids	Not Indicated	1,430 feet north of project
	41001255	340 State St SE	340 State St SE Grand Rapids	Not Indicated	1,430 feet north of project
	41001043	245 State St SE	245 State St SE Grand Rapids 49503	1,2,4 TMB 1,3,5 TMB As Benzene Benzo(a)pyrene Ethylbenzene Fluoranthene Pb Naphthalene Phenanthrene PCE Toluene Xylenes	1,930 feet north of project
	41001077	Grand Rapids Urban Market	109 Logan St SW & 435 Ionia Ave S Grand Rapids 49503	Not Indicated	715 feet west of project
	41001128	40 Logan Street SW	40 Logan St SW Grand Rapids 49503	Not Indicated	700 feet west of project
	41000950	Lescoa, Inc (Plant #2)	549 Ionia SW Grand Rapids 49503	Ni	700 feet west of project
	41002303	629 Ionia Ave SW	629 Ionia Ave SW Grand Rapids	Not Indicated	760 feet west of project
	41001290	45 Franklin St SW	45 Franklin St SW Grand Rapids	Not Indicated	320 feet west of project
	41001211	219 Canton Street SW	219 Canton St SW Grand Rapids 49507	1,2,4 TMB As Cd Cr+3 Fluorene Pb Naphthalene Phenanthrene PCE Xylenes	1,470 feet west of project
	41001155	Leedy Manufacturing	210 Hall St SW Grand Rapids 49507	Not Indicated	1,470 feet west of project
	41000945	320 Hall St	320 Hall St & 1350 Steele Ave SW Grand Rapids 49507	Not Indicated	2,640 feet southwest of project
	41000030	Guardsman Products	1415 Steele Ave SW Grand Rapids 49507	Toluene Xylenes n-Butanol	2,390 feet southwest of project
	41000952	Keeler Brass – Stevens Street SW	236 Stevens St SW Grand Rapids 49507	1,2,4 TMB 1,3,5 TMB As Cr+3 Cu PCU	2,360 feet southwest of project
	41002293	1601 Steele Ave SW	1601 Steele Ave SW Grand Rapids	Not Indicated	3,220 feet southwest of project
	41000035	Hekman Furniture Co	1400 Buchanan Grand Rapids 49507	Fluoranthene Zn Oil & grease	1,690 feet southwest of project
	41001067	1529 South Division Ave	1529 South Division Ave Grand Rapids	Not Indicated	1,825 feet southwest of project
	41000169	Kessler Property	1405 S Divison Grand Rapids 49507	1,2,4 TMB As Benzene Fluoranthene Pb Phenanthrene Se PCE VC	1,165 feet southwest of project
	41001047	44 Fair St SE	44 Fair St SE Grand Rapids 49507	PCE	1,470 feet south of project

Part 201 Sites Near Project Areas

Project	Site ID	Site Name	Address	Contaminants	Location Description
Private Lead Service Line Replacement	41001038	200 Garden St SE	200 Garden St SE Grand Rapids 49507	Anthracene As Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Dibenzo(a,h)anthracene Indeno(1,2,3-cd)pyrene Phenathrene PCE TCE Zn	1,660 feet south of project
	41001281	1514 Jefferson Ave SE	1514 Jefferson Ave SE Grand Rapids	Not Indicated	1,920 feet south of project
	41001157	256 Garden St SE	256 Garden St SE Grand Rapids 49507	Not Indicated	1,660 feet south of project
	41001080	1515 Madison Ave SE	1515 Madison Ave SE 355 Cottage Grove St SE Grand Rapids	Not Indicated	1,920 feet south of project
	41001091	Madison/Cottage Grove Area Contamination	Madison Ave and Cottage Grove St SE Grand Rapids 49507	Not Indicated	2,100 feet south of project
	41000514	Midwest Bumper Company	433 Crofton St SE & 432 Cottage Grove Grand Rapids 49507	Ni	2,340 feet south of project
	41002308	1541 College Ave SE	1541 College Ave SE Grand Rapids	Not Indicated	2,155 feet south of project
	41000213	Rowe International Inc	1500 Union St SE Grand Rapids 49507	PCE TCE	2,030 feet south of project
	41001159	Vesco Oil Corporation – Oakdale St	524 Oakdale St SE (Formerly 1501 Paris Ave SE) Grand Rapids 49507	Not Indicated	1,610 feet south of project
	41001152	1244/1250 Madison Ave SE	1244/1250 Madison Ave SE Grand Rapids 49507	Not Indicated	530 feet south of project
	41001293	739 Cottage Grove SE	739 Cottage Grove SE Grand Rapids	Not Indicated	1,960 feet south of project
	41001292	1530 Eastern Ave Se	1530 Eastern Ave SE Grand Rapids	Not Indicated	2,210 feet south of project
	41002310	Cottage Grove and Marshall Area PFAS Inv	1555 Marshall Ave SE Grand Rapids	Not Indicated	2,210 feet south of project
	41001275	1555 Marshall Ave SE	1555 Marshall Ave SE Grand Rapids	Not Indicated	2,210 feet south of project
	41000033	Hard Chrome Plating	1516 Blaine Ave SE Grand Rapids 49507	Cr+6 Pb	2,045 feet south of project
	41001207	Jaco Tool & Die Inc. (Former)	1045 Cottage Grove St SE Grand Rapids 49507	As Se TCE	2,045 feet south of project
	41001287	1534 Kalamazoo Ave SE	1534 Kalamazoo Ave SE Grand Rapids	Not Indicated	2,045 feet south of project
	41001247	123 Wealthy St SE	123 Wealthy St SE Grand Rapids	Not Indicated	Within project limits
	41001059	335 Jefferson Ave SE	355 Jefferson Ave SE Grand Rapids 49503	Ethylbenzene Naphthalene PCE Xylenes	Within project limits
	41001210	Infinity Companies, LLC	333-351 Commerce SE Grand Rapids	Not Indicated	Within project limits
	41001074	Wealthy Jefferson Development Iniative	412 & 440 Sheldon Ave & 401 LaGrave Ave Grand Rapids 49503	Not Indicated	Within project limits
	41001018	140 Wealthy SE	140 Wealthy SE Grand Rapids 49503	Benzene Naphthalene	Within project limits
	41001294	733 751 759 Wealthy St SE	733 751 759 Wealthy St SE Grand Rapids	Not Indicated	Within project limits
	41001209	920 926 928 Wealthy St SE	920 926 928 Wealthy St SE Grand Rapids 49506	1,2 DCA As Benzene Cd PCE Toluene Xylenes	Within project limits

Part 201 Sites Near Project Areas

Project	Site ID	Site Name	Address	Contaminants	Location Description
Private Lead Service Line Replacement	41001007	941 Wealthy St SE	941 Wealthy SE Grand Rapids 49506	Fluoranthene Phenanthrene	Within project limits
	41001045	1144 & 1146 Wealthy SE	1144 Wealthy SE Grand Rapids 49506	1,1 DCE 1,2,4 TMB Ethylbenzene PCE TCE Xylenes Cis-1,2 DCE	Within project limits
	41001130	1201 Wealthy St SE	1201 Wealthy St SE Grand Rapids	Not Indicated	Within project limits
	41001278	Amoco #5439	1560 Lake Dr SE Grand Rapids	Not Indicated	Within project limits
	41000228	American Laundry (Fmr)/Container Waste	630/634 South Division/ 631 Cornwall SE Grand Rapids 49503	1,2,4 TCB 1,2,4 TMB 1,2 DCP 1,3,5 TMB Benzene Benzo(a)pyrene Ethylbenzene Fluoranthene MTBE Phenanthrene PCE Toluene TCE VC Xylenes Cis-1,2 DCE n-Propylbenzene	Within project limits
	41000932	Container Waste/American Laundry	631 Cornwall Ave SE/ 634 South Division Grand Rapids	Not Indicated	Within project limits
	41001264	900 South Division Ave	900 South Division Ave Grand Rapids	Not Indicated	Within project limits
	41000933	1007-1025 S. Division	1007-1025 S. Division Grand Rapids 49507	1,2,4 TMB 1,3,5 TMB Ethylbenzene Fluorene Pb Naphthalene Phenanthrene PCE Toluene TCE Xylenes n-Propylbenzene	Within project limits
	41000510	Former Clark Station-Part 213	305 Franklin Grand Rapids 49507	Not Indicated	Within project limits
	41001153	349 Franklin Street SE	349 Franklin Street SE Grand Rapids 49503	Not Indicated	Within project limits
	41001240	415 Franklin Street SE	415 Franklin Street SE Grand Rapids	Not Indicated	Within project limits
	41001092	513 Eastern Avenue Dry Cleaner	513 Eastern Avenue SE Grand Rapids 49503	Not Indicated	Within project limits
	41001049	538 Eastern Avenue SE	538 Eastern Avenue SE Grand Rapids 49506	PCE	Within project limits
	41001085	341 Hall Street & 1164 Prospect Avenue S	341 Hall Street & 1164 Prospect Avenue S Grand Rapids 49507	Not Indicated	Within project limits
	41001121	413 Hall Street SE	413 Hall Street SE Grand Rapids	Not Indicated	Within project limits
	41001062	Iroquois Middle School – Former	1501 Fisk Street SE Grand Rapids	Not Indicated	Within project limits

Part 201 Sites Near Project Areas

Project	Site ID	Site Name	Address	Contaminants	Location Description
Giddings Avenue Water Main	41000033	Hard Chrome Plating	1516 Blaine Ave SE Grand Rapids 49507	Cr+6 Pb	2,715 feet northwest of project
	41001207	Jaco Tool & Die Inc. (Former)	1045 Cottage Grove St SE	As Se TCE	2,265 feet northwest of project
	41001287	1534 Kalamazoo Ave SE	1534 Kalamazoo Ave SE Grand Rapids	Not Indicated	1,555 feet northwest of project
Valley Avenue and Garfield Avenue Water Main	41000556	Sunoco #0008-2834	840 Bridge St NW Grand Rapids 49504	Not Indicated	2,200 feet east of project
	41001268	1001 Fulton Street West	1001 Fulton Street West Grand Rapids	Not Indicated	1,280 feet east of project
	41000808	Consumers Energy – Wealthy St Extension	900-1200 Butterworth Ave SW Grand Rapids 49504	TCE PNAs	1,630 feet southwest of project

LUSTs Near Project Areas

Project	Site ID	Site Name	Address	Status (Open/Closed)
Collge Avenue Water Main	00034814	Kent Country Club	1600 College Ave Grand Rapids 49505	Open
	00042395	Bernies Motor Sales	457 Leonard St Grand Rapids 49503	Open
	50005675	B&B Party Stop	501 Leonard St Grand Rapids 49503	Open
	00034365	Grand Rapids Public School	900 Union Ave Grand Rapids 49503	Closed
	50005418	Grooters Asset Development LLC	201 Matilda St Grand Rapids 49503	Open
	00015568	Marks Zephyr	1150 Plainfield Ave Grand Rapids 49503	Open
	00002480	Grand Rapids Veterans	1166 Plainfield Ave Grand Rapids 49503	Open
	00010866	Locomotive Facility	1541 Plainfield Ave Grand Rapids 49505	Open
	00021379	Amoco Oil Co	1171 Plainfield Ave Grand Rapids 49503	Open
	00013551	Valvoline Instant Oil Change	1200 Plainfield Ave Grand Rapids 49505	Open
Straight Avenue SW and Wealthy Street SW	00008372	Dave Cole Decorators Inc	40 Lexington Ave Grand Rapids	Closed
	00041380	Former Adobe Property	610 Fulton St Area Grand Rapids 49503	Open
	00017843	Ryder Truck Rental 2624	505 Lake Michigan Dr Grand Rapids 49504	Closed
	00017835	Lc-2624 Ryder Truck Rental	504 Lake Michigan Dr Grand Rapids 49504	Closed
	00039629	Former Frasier Grinding Site	79 Summer Ave Grand Rapids 49504	Closed
	00010937	Ted's Service	1100 Fulton St Grand Rapids 49504	Open
	00015926	Roskam Baking Co	1140 Butterworth St Grand Rapids 49504	Closed
	00041524	Former Edgar S Keifer Tanning Co	240 Front Ave Grand Rapids 49504	Open
	00011848	Admiral Petroleum Co #94	346 Fulton St Grand Rapids 49504	Closed
Page, Carrier, Lister, and Plainfield Improvements	00008472	Plastic Plate Inc	1648 Monroe Ave Grand Rapids 49505	Closed
	00013551	Valvoline Instant Oil Change	1200 Plainfield Ave Grand Rapids 49505	Open
	00034814	Kent County Club	1600 College Ave Grand Rapids 49505	Open
	00042395	Bernies Motor Sales	457 Leonard St Grand Rapids 49503	Open
	50005675	B&B Party Stop	501 Leonard St Grand Rapids 49503	Open
	00000682	Monroe Avenue Fire Station	1181 Monroe Grand Rapids 49504	Closed
	00013835	Vets Cab	1001 Monroe Ave Grand Rapids 49503	Open
	50005418	Grooters Asset Development LLC	201 Matilda St Grand Rapids 49503	Open
	00021908	Autodie International Inc	44 Coldbrook St Grand Rapids 49503	Closed
	50002078	Waddell Manufacturing (former)	1115 Taylor Ave Grand Rapids 49503	Closed
	00005882	Dreswel Dry Cleaners	1135 Plainfield Ave Grand Rapids 49503	Closed
	00021379	Amoco Oil Co	1171 Plainfield Ave Grand Rapids 49503	Open
	00015568	Marks Zephyr	1150 Plainfield Ave Grand Rapids 49503	Open
	00002480	Grand Rapids Veterans	1166 Plainfield Ave Grand Rapids 49503	Open
	00010866	Locomotive Facility	1541 Plainfield Ave Grand Rapids 49505	Open

LUSTs Near Project Areas

Project	Site ID	Site Name	Address	Status (Open/Closed)
Private Lead Service Line Replacement	00033636	Grand Rapids Foam Rubber Co	55 Market Ave Grand Rapids 49503	Closed
	00017969	Grand Rapids Wood Finishing Co	61 Grandville Ave Grand Rapids 49503	Closed
	50002594	Former Oakes St Filling Station	226 Oakes St Grand Rapids 49503	Open
	00013947	Ronda Tire Inc	130 Market Ave Grand Rapids 49503	Closed
	00017877	Downtown Mobil Mart	248 Cherry St Grand Rapids 49503	Open
	00034717	Pacific Pride	231 Bartlett St Grand Rapids 49503	Closed
	00034518	Michigan Lithographing Co	217 Grandville Ave Grand Rapids 49503	Closed
	00004970	Preston Trucking Co Inc	235 Grandville Ave Grand Rapids 49503	Closed
	50002188	Tol Realty Building	252 Grandville Ave Grand Rapids 49503	Open
	00009106	Mid-Michigan Truck Service Inc	324 Ellsworth Ave Grand Rapids 49503	Open
	00039385	Club Travesty Inc	62 Commerce Ave Grand Rapids 49503	Closed
	00003786	Boulevard Professional Center	26 Sheldon Blvd Grand Rapids 49503	Closed
	00037472	Richard Byington Property	19 LA Grave Ave Grand Rapids 49503	Closed
	00000155	Ferguson Ventures Inc	72 Sheldon Blvd Grand Rapids 49503	Closed
	00042271	Railway Express Agency	47 Williams St Grand Rapids 49503	Closed
	00040753	Usps Vehicle Maint Facility	258 Commerce Ave Grand Rapids 49503	Closed
	00021814	Uptown Cleaners Inc	350 Division Ave Grand Rapids 49503	Closed
	00039001	Vacant Property	348 Sheldon Blvd Grand Rapids 49503	Closed
	00034948	Marjorie Brady	357 Jefferson Ave Grand Rapids 49503	Open
	00016192	Mercy Health Saint Marys	200 Jefferson Ave Grand Rapids 49503	Open
	00008481	Fulton Heights BP	969 Lake Dr Grand Rapids 49506	Open
	00041853	Fairmont Square	920 Cherry St Grand Rapids 49506	Closed
	00010525	Manpower Inc	1001 Lake Dr Grand Rapids 49506	Closed
	00034517	Michigan Lithographing Co	1 Carlton Ave Grand Rapids 49506	Open
	00004898	Amoco Oil Service Station #7401	1400 Fulton St Grand Rapids 49503	Open
	00038961	Valley City Linen	10 Diamond Ave Grand Rapids 49506	Closed
	00010076	Tml Inc	607 Century Ave Grand Rapids 49503	Closed
	00008216	Bouma Furniture	146 Pleasant St Grand Rapids 49503	Closed
	00015512	Kooi Industrial Painting	225 Graham St Grand Rapids 49503	Closed
	00000685	Franklin St Fire Station	115 Franklin Grand Rapids 49506	Closed
	00016203	Richards Manufacturing Co	725 Ionia Ave Grand Rapids 49503	Closed
	00000003	BlueLinx Corp	825 Buchanan Ave Grand Rapids 49507	Closed
	00008068	Union Station 219 Canton	219 Canton St Grand Rapids 49507	Closed
	50001128	Dell Company	1266 Wallen Ave Grand Rapids 49507	Closed
	00038772	Woodland Int'l Trucks Inc	215 Hall St Grand Rapids 49507	Closed

LUSTs Near Project Areas

Project	Site ID	Site Name	Address	Status (Open/Closed)
Private Lead Service Line Replacement	00039976	Western Michigan International Truck	145 Hall St Grand Rapids 49507	Closed
	00008010	Thermo King Michigan Inc	1225 Randolph Ave Grand Rapids 49507	Closed
	00002404	Bestrom Oil Co Inc	1255 Randolph Ave Grand Rapids 49507	Open
	00003561	Bertsch Co	1505 Steele Ave Grand Rapids 49507	Closed
	00008116	Plummers Environmental Serv Inc	1518 Steele Ave SW 1520 Av Grand Rapids 49502	Closed
	00015558	Pridgeon & Clay, Inc	122 Cottage Grove St Grand Rapids 49507	Closed
	00017950	R E Westgate	319 Division Ave Grand Rapids 49507	Open
	50000323	Marjorie M Rodin	1401 Division Ave Grand Rapids 49507	Open
	00011640	Grand Rapids Garage & Strm	1415 Division Ave Grand Rapids 49507	Open
	50002084	Michigan Termite Service Inc	1558 Division Ave Grand Rapids 49507	Open
	00018085	Spencer Auto Service	1614 Jefferson Ave Grand Rapids 49507	Open
	00019518	Sealy Mattress Co	636 Crofton St Grand Rapids 49507	Closed
	00000262	Kelly Distributing	1580 Eastern Ave Grand Rapids 49507	Closed
	00016201	Standard Supply & Lumber	1535 Kalamazoo Ave Grand Rapids 49507	Closed
	00000997	Grand Rapids Urban Market	435 Ionia Ave Grand Rapids 49503	Open
	00039954	Abandoned Property	1250 Madison Ave Grand Rapids 49507	Open
	00004307	A&A Cleaners	300 Wealthy St Grand Rapids 49503	Open
	50005908	1056 Wealthy St SE	1056 Wealthy St SE Grand Rapids 49506	Open
	50005180	Abandoned Site	1201 Wealthy St Grand Rapids 49506	Open
	00000047	Dairy Mart #9603	1540 Wealthy St Grand Rapids 49506	Closed
	00005815	East Town Citgo	1560 Lake Dr Grand Rapids 49506	Closed
	00010524	Eli's Shell Auto Wash	415 S Division Grand Rapids 49502	Open
	00000438	International Paper	13 Mcconnell St Grand Rapids 49503	Closed
	50001759	Amoco (former) Division	512 Division Ave Grand Rapids 49503	Open
	00040683	Container Waste Services	631 Cornwall Ave Grand Rapids 49503	Open
	00040682	Vacant Site	618 Division Ave Grand Rapids 49503	Open
	00039090	Former American Laundry	623 Division Ave Grand Rapids 49503	Open
	00033352	American Laundry	634 Division Ave Grand Rapids 49503	Open
	00004393	Meris Towing Service Inc	1100 Division Ave Grand Rapids 49507	Closed
	00033189	Hall & Division LLC	1 Hall St Grand Rapids 49507	Closed
	00012662	Great Lakes Triad Pkg Corp	1151 Sheldon Ave Grand Rapids 49507	Closed
	00012375	Former Clark Station	305 Franklin St Grand Rapids 49507	Open
	00005704	Vick Corp	801 Franklin St Grand Rapids 49507	Closed
	50002510	Former Cutie Pies Party Store	360 Hall St Grand Rapids 49507	Open
	00000668	Oakhill Cemetery 668	647 Hall St Grand Rapids 49507	Closed

LUSTs Near Project Areas

Project	Site ID	Site Name	Address	Status (Open/Closed)
Giddings Avenue Water Main	00016201	Standard Supply & Lumber	1535 Kalamazoo Ave Grand Rapids 49507	Closed
	00018171	Black Gold Inc.	1405 Burton St Grand Rapids 49507	Closed
	50000320	Stop-n-go	2005 Kalamazoo Ave Grand Rapids 49507	Closed
	00004104	Zandees Auto Repair	1205 Burton St Grand Rapids 49507	Closed
	00016502	Michigan Certified Concrete	1235 Hoyt St Grand Rapids 49507	Closed
Eleanor Street Water Main	00035833	Van Andel & Flikkema Motor Sales	2225 Plainfield Ave Grand Rapids 49505	Closed
	00035834	Former Monteith Pro Tire	2221 Plainfield Ave Grand Rapids 49505	Closed
	00003135	Burger King Property Store #7636	2204 Plainfield Ave Grand Rapids 49505	Closed
	00010507	Elis Northeast Autowash Inc	1965 Fuller Ave Grand Rapids 49505	Closed
Plainfield Avenue Water Main	00035833	Van Andel & Flikkema Motor Sales	2225 Plainfield Ave Grand Rapids 49505	Closed
	00035834	Former Monteith Pro Tire	2221 Plainfield Ave Grand Rapids 49505	Closed
	00003135	Burger King Property Store #7636	2204 Plainfield Ave Grand Rapids 49505	Closed
	00010507	Elis Northeast Autowash Inc	1965 Fuller Ave Grand Rapids 49505	Closed
	00001588	Grand Rapids Home for Veterans	3000 Monroe Grand Rapids 49505	Closed
Valley Avenue and Garfield Avenue Water Main	50001741	Parbells Service/Verbrugge Oil	840 Bridge St Grand Rapids 49504	Open
	00006157	Cawdin Auto	1021 Bridge St Grand Rapids 49504	Open
	50001736	Bridge Street Gas Station	1115 Bridge St Grand Rapids 49504	Open
	00010937	Ted's Service	1100 Fulton St Grand Rapids 49504	Open
	00012220	Value Mkt Express #1341	1205 Fulton St Grand Rapids 49504	Open

Appendix 3

CITY OF GRAND RAPIDS
ADMINISTRATIVE POLICY

NUMBER: 17-01	DATE: March 28, 2017
REVISIONS: 7/31/2019	
ISSUED BY: City Manager	SIGNED: 

SUBJECT: Replacement of Privately-owned Lead Water Service Line

PURPOSE: To provide for the replacement of privately-owned portion of a lead water service line (i) whenever a leak or failure has been discovered on either the privately owned or Water Supply System ("WSS") owned portion of the service or (ii) when any portion of the WSS owned lead water service line is replaced on either a planned or emergency basis.

INTRODUCTION:

A review of scientific and professional resource materials supports the conclusion that partial lead water service line replacement of the publicly owned portion could cause harm that may not occur if there were a full lead water service line replacement.

A September 2011 cover letter to the United States Environmental Protection Agency ("EPA") Administrator accompanying a report of the Drinking Water Committee of EPA's Science Advisory Board states in part: "The weight of evidence indicates that partial lead water service line replacement often causes tap water lead levels to increase significantly for a period of days to weeks, or even several months." The letter further states that full lead water service line replacement "appears generally effective in reliably achieving long-term reductions in drinking water lead levels, unlike partial lead water service line replacement" and, in summary, states that "the Science Advisory Board found that available information is broadly suggestive that partial lead water service line replacement may pose a risk to the population, due to the short-term elevations in drinking water lead concentrations."

In 2018, the State of Michigan adopted Michigan Administrative Code Rule 604f, i.e. R325.10604f, entitled "Treatment techniques for lead and copper" pursuant to the Safe Drinking Water Act, Act 399 of Public Acts of Michigan of 1976, as amended ("Act 399"). Rule 604f requires a reduction in the threshold of allowable lead in water to 12 parts per billion by 2025. Water supplies with lead service lines, regardless of lead action level values, must replace all lead service lines at an average rate of five percent per year, not

to exceed 20 years, or in accordance with an alternate schedule incorporated into an asset management plan, and approved by the MDEQ. Partial lead service line replacement is no longer permitted, except in case of an emergency repair and the full lead service line must be replaced at the expense of the water supply. The new rules apply to residential and commercial owned lead water service line.

Since all potable water provided through the WSS is potentially capable of human consumption, all privately-owned water service lines, whether they are for residential, commercial, industrial or government use, shall be replaced in accordance with this policy. Such replacement shall be accomplished for general public health and safety purposes.

This Administrative Policy is used pursuant to Section 2.23, Management of Water System, of Article 2, Water System Use, of Chapter 26, City Water System of Title II, Utilities and Services, of the Code of Ordinances of the City.

DEFINITIONS:

"Eligible lead water service line" means all privately-owned water service lines, whether they are for residential, commercial, industrial or government use, since all potable water provided through the WSS is potentially capable of human consumption.

"Lead water service line" means either a service line which is made of lead, or any lead pigtail, lead gooseneck or other lead fitting that is connected to the service line, or both.

"Privately-owned portion of a lead water service line" means the section of lead water service piping from the outlet joint of the curb stop to customer site piping or building plumbing at the first shut-off valve inside the building or 18 inches inside the building.

Water Supply System ("WSS") means the water utility operated by the City of Grand Rapids, including its retail partner communities.

"WSS owned portion of a lead water service line" means the section of lead water service piping from the discharge of the corporation fitting on the water main to, but not including, the outlet joint of the curb stop.

REPLACEMENT REQUIREMENT:

The City's WSS shall, at its cost and at no cost to the property owner, replace the privately owned portion of a lead water service line whenever:

a. a leak or failure has been discovered on either the privately owned or WSS portion of the service line; or

b. when any portion of the WSS owned portion of the service line is replaced on either a planned or an emergency basis.

In the event that a non-WSS project creates a disturbance of an existing lead service line, the party creating the disturbance shall be responsible for the replacement of the full lead service line and it costs.

REPAIR OR RECONNECTION PROHIBITED.

Repair of an existing lead water service line, or reconnection of a privately-owned lead water service line to the WSS is prohibited by Michigan Administrative Code Rule 604f, i.e.R325.10604f, entitled “Treatment techniques for lead and copper” promulgated pursuant to Public Act 399 (Safe Drinking Water Act), as amended.

EXCEPTION.

The City Manager or his/her designee may grant a temporary exception to the replacement requirement or the repair or reconnection prohibition if he/she determines that doing so will not create an imminent threat to the health, safety or welfare of the public.

NOTICE.

Leak or Emergency Replacement. In the event of a lead water service line leak or failure or an emergency replacement of the WSS owned portion of the lead water service line, the City Manager or his/her designee shall promptly provide written notice to the property owner of the replacement requirement and the property owner shall sign and provide the City with a water service line replacement agreement as hereinafter provided for the privately owned portion of the lead water service line before replacement can begin.

Planned Replacement. In the event of a planned replacement of a WSS owned portion of a lead water service line, the City Manager and/or his/her designee shall provide at least 30 days written notice prior to the commencement of the planned replacement and the property owner shall sign and provide the City with a water service line replacement agreement as hereinafter provided for the privately owned portion of the lead water service line before replacement can begin.

WATER SERVICE LINE REPLACEMENT AGREEMENT.

Before a privately owned lead water service line can be replaced the property owner shall sign and provide the City with a water service line replacement agreement on a form provided by the City (a) acknowledging to ownership of the property being served by the lead water service line, (b) permitting access to the City or its contractor to replace the privately owned lead water service line and any related testing and adjustments during any contractor guarantee period, (c) retaining full ownership, maintenance, repair and replacement for that portion of the privately owned service line and related appurtenances not replaced, and (d) agreeing to assume ownership of the water service line that replaces the privately owned lead water service line and be fully responsible for its ownership and, after the expiration of any guarantee period, its maintenance, repair and replacement.

FAILURE TO SIGN WATER SERVICE LINE REPLACEMENT AGREEMENT.

If the City Manager or his/her designee has determined, in accordance with this Administrative Policy, to replace a privately owned lead water service line and the property owner of such dwelling has declined or failed to respond to requests to sign a

water service replacement agreement, (a) the City may, upon notice to the property owner, discontinue water service if the City determines there is an imminent threat to the health, safety or welfare of the public or (b) the City Manager may request that the City Attorney or special counsel apply for and obtain an appropriate court-issued order authorizing replacement in accordance with the terms in the water service replacement agreement.

Lead Service Replacement Checklist Form

Address: _____ Date: _____

Service Worker: _____

Leak on a Lead Service? What can be done?

If there is a leak on the lead water service, the City of Grand Rapids may be able to pay for the replacement of the water service. There are a number of conditions that must be met for the City of Grand Rapids to pay for the replacement of the private portion of the lead service:

CHECKLIST:

- Emergency water service leak confirmed on private or public side of water service; verified by city representative

  One of the following conditions qualify for lead service replacement of commercial/residential accounts:
  ____ City-side lead service leak
  ____ Broken curb stop
  ____ Private-side lead service leak
  ____ Lead wipe joint leak
  ____ Leak on galvanized pipe downstream of lead service line

- Reported water service leaks must occur AFTER 3/28/17.
- Must have lead water service verified by a City of Grand Rapids representative.
- Water Service Agreement must be signed BEFORE work begins on homeowners' side of water service.
- Repairs must be coordinated by City and performed by approved City Contractor (under existing service contract) in order to be paid by the City of Grand Rapids. The City will solicit quotes from these contractors and authorize City's contractor to replace private portion of the lead service line.
- Water service material type to be reinstalled is to be Type K copper.
- Is property "front-back" situation? If so, replace lead service line with new service to each home.

There can be expectations to the replacement requirement or repair prohibition if it is determined that doing so will not create an imminent threat to the health, safety or welfare of the public.

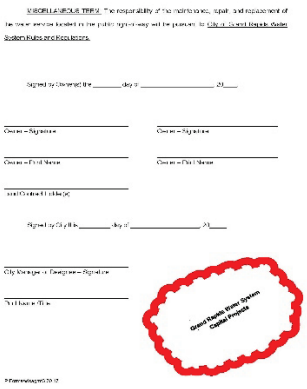
Call one of our Field Operations Supervisors at 456-3141.

Negligent actions by the homeowner or a contractor will disqualify the service from a City sponsored replacement.

CAPITAL PROJECT LSLR MAILING CHECKLIST

Agreements

- Fill in address on 1st page of agreement
- Make sure Signature sheet of agreement has the "Grand Rapids Water System Capital Projects" stamp on it in the lower right portion of the page:



Letters

Owners

- All owners need to be mailed the letter and agreement
- Address Format for window in Envelope

  Property owner

  1234 Street Name

  Grand Rapids, MI 49505

Customers

- Only customers with a different name AND address than owner
- Address Format for window in Envelope

  JOHN DOE OR CURRENT RESIDENT
  2711 ORDWAY ST NW APT 204
  WASHINGTON DC 20008-5036

If excluding the name, use this format:

HOUSEHOLDER
2711 ORDWAY ST NW APT 204
WASHINGTON DC 20008-5036

- Envelope can't have "RETURN SERVICE REQUESTED" printed on it, and be addressed to "OR CURRENT RESIDENT"
- When you put this mail in your outgoing mail area, please separate it from the regular mail and label it as No Endorsement
- Another suggestion is to include a line of text on the envelope (to the right of the mailing address or above & to the center of the mailing address) that says "IMPORTANT PROPERTY INFORMATION" or something of that sort.

WATER SYSTEM

CITY OF GRAND RAPIDS

Notice of Water Service Line Replacement

Por favor ver atrás para traducción en español

Date

Hello, Neighbor:

We're committed to delivering high-quality water and we work hard to protect your health. We're reaching out because our records show the water service line to your home may include a lead pipe. If so, **we can replace your lead service line at no cost to you** while we're doing road work on your street that includes replacement of the water main.

Did you know that swallowing or breathing in lead may result in lead poisoning and young children are at most risk? By replacing your lead water service line, we can help remove a health risk in your home and protect you and your loved ones.

Please contact our office as soon as possible to give us permission to enter your home to see whether there's a lead service line. If we find one, we ask that the homeowner signs the enclosed agreement and return it to us at the following address:

Lead Service Line Replacement Program
1900 Oak Industrial Drive Dr. NE
Grand Rapids, MI 49505

Scheduling your lead service line replacement is very important. Your response is needed as soon as possible. Please contact us at 616. 456. 4678 or leadfreewater@grcity.us to schedule an appointment.

In partnership,

Your Grand Rapids Water System Team

WATER SYSTEM

CITY OF GRAND RAPIDS

Aviso de reemplazo de servicio de agua

Fecha

Hola, vecino:

Nosotros estamos comprometidos de producir agua de alta calidad y estamos trabajando duro para proteger su salud. Estamos tratando de contactarlo porque nuestros datos indican que su servicio de agua puede contener plomo. Si ese es el caso, nosotros **vamos a reemplazar su servicio de agua sin costo a usted** durante el proyecto de construcción que ocurrirá en su calle que incluirá el reemplazo de la cañería principal.

Usted sabe que ingerir o respirar plomo puede resultar en intoxicación de plomo y niños pequeños están en más riesgo? Reemplazando su línea de servicio de plomo, podemos ayudar a eliminar un riesgo de salud de su casa que protegerá a usted y sus seres queridos.

Por favor de contactarnos a nuestra oficina para darnos permiso para entrar a su casa y verificar si su línea de servicio de agua es de plomo. Si encontramos plomo, el dueño de casa tendrá que firmar el contrato y regresarlo a esta dirección:

Lead Service Line Replacement Program
1900 Oak Industrial Drive Dr. NE
Grand Rapids, MI 49505

Si no podemos reemplazar su línea de servicio de plomo, no podemos reconectar su servicio de agua al sistema público. **Esto significa que no tendrá servicio de agua en su casa. Llamando para ser una cita es muy importante y necesitamos que nos responda rápidamente. Por favor de contactarnos at 616.456.4550 o leadfreewater@grcity.us para ser una cita.**

Gracias,

El Sistema de agua de Grand Rapids

WATER SYSTEM

CITY OF GRAND RAPIDS

SECOND NOTICE OF WATER SERVICE LINE REPLACEMENT

Por favor ver atrás para traducción en español

Date:

Hello, Neighbor:

We're again trying to contact you about road work on your street that includes a water main replacement. Our records show the water service line to your home may include a lead pipe. If so, we can replace your lead service line **at no cost to you**. Swallowing or breathing in lead may result in lead poisoning, and young children are at most risk.

Please contact our office as soon as possible to give us permission to enter your home to see whether there's a lead service line. If we find one, we ask that the homeowner signs the enclosed agreement and return it to us at the following address:

Lead Service Line Replacement Program
1900 Oak Industrial Drive Dr. NE
Grand Rapids, MI 49505

If we can't replace your lead service line, we can't reconnect your water service to the public water supply once the water main is replaced. **That means you won't have water service in your home. Scheduling your lead service line replacement is very important. Your response is needed as soon as possible. Please contact us at 616.456.4678 or leadfreewater@grcity.us to schedule an appointment.**

In partnership,

Your Grand Rapids Water System Team

WATER SYSTEM

CITY OF GRAND RAPIDS

Segundo aviso de reemplazo de servicio de agua

Fecha

Hola, vecino:

Estamos tratando de contactarlo sobre el proyecto de construcción que ocurrirá en su calle que incluirá el reemplazo de la cañería principal. Nuestros datos indican que su servicio de agua puede contener plomo. Si ese es el caso, nosotros vamos a reemplazar su servicio de agua **sin costo a usted** durante el proyecto de construcción. Ingiriendo o respirando plomo puede resultar en intoxicación de plomo y niños pequeños están en más riesgo.

Por favor llame a nuestra oficina para darnos permiso para entrar a su casa y verificar si su línea de servicio de agua es de plomo. Si encontramos plomo, el dueño de casa tendrá que firmar el contrato y regresarlo a esta dirección:

Lead Service Line Replacement Program
1900 Oak Industrial Drive Dr. NE
Grand Rapids, MI 49505

Si no podemos reemplazar su línea de servicio de plomo, no podemos reconectar su servicio de agua al sistema público. **Esto significa que no tendrá servicio de agua en su casa. Llamando para ser una cita es muy importante y necesitamos que nos responda rápidamente. Por favor de contactarnos al 616.456.4550 o leadfreewater@grcity.us para ser una cita.**

Gracias,

El Sistema de agua de Grand Rapids

CITY OF GRAND RAPIDS ENGINEERING DEPARTMENT

SPECIAL SPECIFICATION
FOR
WATER MAINS - CONSTRUCTION OF WATER SERVICES OUTSIDE THE RIGHT-OF-WAY

a. Description. This project will construct new copper water service pipe from proposed or existing curb stop boxes to proposed or existing water meters for properties within the project limits. The work will include conducting an exploratory investigation to the expose the existing water service from the curb box to the meter (building), the placement of the new service with trenchless technology, and may include open cut construction when required or as directed by the Engineer. The work shall be done in accordance with the City of Grand Rapids Standard Construction Specifications and as specified herein.

The location of the existing water services and proposed water services from the curb box to the structure (meter location) as shown on the Drawings are only approximate. The Contractor shall field verify all service locations prior to the placement of the new copper water service.

b. Materials. All materials used to construct water services outside the public ROW, including all internal plumbing required to re-connect water services, shall be in accordance with the Standard Construction Specifications, ANSI A13.1 Standard for the Identification of Piping Systems, NSF/ANSI 61-2012 Drinking Water System Components, NSF/ANSI 372 -2011 Drinking Water System Components, ASME B31.9 Building Service Piping, ASTM A325 Structural Bolts, Stee, Heat Treated, 120/105 ksi Minimum Tensile Strength, EPA U.S. Safe Drinking Water Act (US SDWA) 2014 and the Michigan Plumbing Code.

All materials used to restore any lawn, sidewalks, driveways, and landscaping disturbed by the construction of water services outside the public ROW shall also be in accordance with the Standard Construction Specifications and shall match the existing material being disturbed, or as Directed by the Engineer.

Trenchless Technology Submittals The Contractor shall furnish document(s) supporting the directional drilling Contractor's qualifications and experience.

Equipment and Expertise - The Contractor shall have equipment and expertise, appropriate for horizontal directional drilling, horizontal boring or other Engineered approved trenchless installations. This includes the preparation and maintenance of the bore path using drilling fluids as appropriate for the geology of the soils. The Contractor shall also have experience in safety and dependability installing, in similar geology, similar size and length of piping involved.

Work Plan - Prior to beginning work, the Contractor shall submit to the Engineer a work plan detailing the procedure and schedule to be used to execute the project. The Contractor shall also submit all proof of all required permits. The work plan shall include a description of all equipment to be used, down-hole tools, a list of personnel and their qualifications and experience (including back-up personnel in the event that an individual is unavailable), list of subcontractors, a schedule of work activity, a safety plan (including MSDS of any potentially hazardous substances to be used), traffic control plan (if applicable), an environmental protection plan and contingency plans for possible problems. Work plan shall be comprehensive, realistic and based on actual working conditions for this particular project. Plan shall document the thoughtful planning required to successfully complete the project.

c. Construction. Construction shall be according to Divisions 19 of the City of Grand Rapids Standard Construction Specifications and as specified herein.

General - The City will obtain grading permits and agreements from individual property owners for the water service construction outside the ROW. Prior to starting any work outside the ROW, the Contractor shall verify with the Engineer that the appropriate grading permits and agreements have been obtained from the property owner.

Plumbing permits will be required for work performed inside and outside existing buildings. The Contractor shall secure all required permits and pay all associated fees. All plumbing work inside and within five feet of a building shall be performed by a licensed plumber in possession of a valid permit. The Contractor will coordinate with the City plumbing inspector and water department. A list of names, addresses, and telephone numbers will be made available to Contractor.

Exploratory Investigation – Establish necessary lane, shoulder and/or sidewalk closures required to perform work. Advance the exploratory excavation using vacuum boring excavation, hand digging, conventional machine excavation, or a combination thereof subject to approval of the Engineer. Allow the Engineer access to document the necessary information. If the technique used to advance the excavation is causing damage to the existing facilities, ease all work until an alternate method approved by the Engineer.

Prior to construction of the proposed water service, the Contractor and licensed plumber shall coordinate with the Engineer and the property owner to determine the location of the proposed service, new meter (if required) and construction schedule.

Water Service Outside of the Right of Way - Where shown on the Drawings, the Contractor shall construct water services outside the public ROW and re-connect them to the new or existing copper water service at the curb stop. The Contractor will schedule the work for the services such that at no time will connections from any new copper service piping to lead services.

Place water services perpendicular the water main unless otherwise approved by the Engineers, and a minimum of 5 feet deep from finish grade.

Basement Penetration - Core drill 3-inch maximum hole for 1-inch or 1-1/2-inch copper service. Coordinate hole sized for copper services over 1-1/2-inch with Engineer. Hole to be minimum of 5 feet below exterior finished grade. If basement wall is nonexistent or cannot be drilled, the copper may be fed into the house through the basement floor with tunneling equipment. Seal void between hole and copper with Fosrock, Preco Plug, or equal. Existing service lines may not be used for new connections, unless approved by Engineer.

Connection of New Service Line:

1. Connect new shut off valve, copper horn, and meter within 3 feet of basement wall, or as approved by the Engineer.
2. Continue copper to existing house plumbing, match existing size, 1 inch minimum. Connect to maximum pipe size of system. Provide all copper and fittings necessary to make connection.
3. Flush water system until water clears, check all new plumbing for leaks.
4. Restore temporary removals or damages to the lawn, driveway, or building.
5. Have homeowner sign a letter of acceptance of the Work, in a form approved by Engineer.
6. The contractor shall not connect proposed copper back to an existing lead service for any reason. Temporary or otherwise.

Remote Meters - If building does not have a basement, or an area where meter can be installed inside of the first floor, utilize a meter pit. Install City of Grand Rapids standard meter pit per detail WS-5 on private property in a location approved by the homeowner. Run new copper into the home and install a new shut off valve. Install new copper to the existing house plumbing. Install remote meter reader per City standard detail, or as approve by the Engineer. Flush water system until water clears, check all new plumbing for leaks. Restore temporary removals or damages to the lawn, driveway, or building.

Saw cut existing supply line just inside basement wall and plug pipe with threaded or soldered cap.

For trench excavation approved by the Engineer, the Contractor shall saw cut existing bituminous and concrete surfaces and shall carefully remove all paved areas inside and around all buildings affected by the project. The Contractor shall directional drill the proposed water services in all instances where removal and replacement of walls, trees, concrete stairs, porch structures and other appurtenances not on the bid form would be required.

Following the placement of the water service, the Contractor shall restore the area disturbed outside the ROW to match the conditions prior to construction of the service.

d. Measurement and Payment. The completed work as measured for the construction of water services outside the right of way will be paid for at the contract unit price for the following contract items (pay items).

Pay Item	**Pay Unit**
__" Water Service (Curb Box to Meter)	each
__" Water Service (Curb Box to Meter), over 60 feet	each
Internal Plumbing, Water Service	dollars
Exploratory Investigation, Water Service	each
Meter Pit, per Detail ___	each

"__" Water Service (Curb Box to Meter)" shall be payment in full for placement of new copper water service from the curb box line to the building penetration at the meter or proposed meter location utilizing directional drilling or other approved trenchless technology, and includes furnishing and placing all copper piping, fittings, sand backfill, permit fees and any incidental work required for the proper placement of the water services.

"__" Water Service (Curb Box to Meter), over 60 feet" shall be payment in full for placement of new copper water service in locations where the distance from the curb stop box to the building penetration location exceeds 60 feet. "__" Water Service (Curb Box to Meter), over 60 feet" will be measured and paid when the service exceeds a 60 foot distance from the curb box to the building penetration and will be paid in addition to __" Water Service (Curb Box to Meter) and includes furnishing and placing all copper piping, fittings, sand backfill and any incidental work required for the proper placement of the water services.

"Internal Plumbing, Water Service" is an allowance established to pay for all materials, labor, and equipment, including the services of a licensed plumber, required to replace the water service inside and within five feet of a building and connect the service to the existing or proposed service meter. Where the work is performed by a subcontractor or supplier, the Contractor will be paid for the amount invoiced plus an additional 6% of the invoiced cost as reimbursement for the Contractor's administrative costs. Where the Contractor will be performing the work with his own forces, the work will be paid for using predetermined, negotiated prices. If the Contractor and Engineer cannot agree upon prices, the work will be paid for by force account in accordance with section 109.07 of the MDOT Standard Specifications for Construction.

"Exploratory Investigation, Water Service" will be paid for at the Contract unit price for the exploratory investigation of existing water services. "Exploratory Investigation, Water Service" will be paid only once each for each individual water service. At locations where abatement is not required and the excavation of the existing water service is part of the connection of a new copper service from the main to the curb box, the excavation will not be paid separately but will be considered included in the price of the new water service. "Exploratory Investigation, Water Service" includes all labor, equipment and materials

required to complete the work, including all costs associated with repair or replacement resulting from the contractor's activities.

"Meter Pit, per Detail ___" shall be payment in full for placement of new meter pit. The price shall be payment in full for furnishing all labor, equipment and material and shall include all work as listed in the measure and payment section of Division 20 of the City of Grand Rapids Standards Specification.

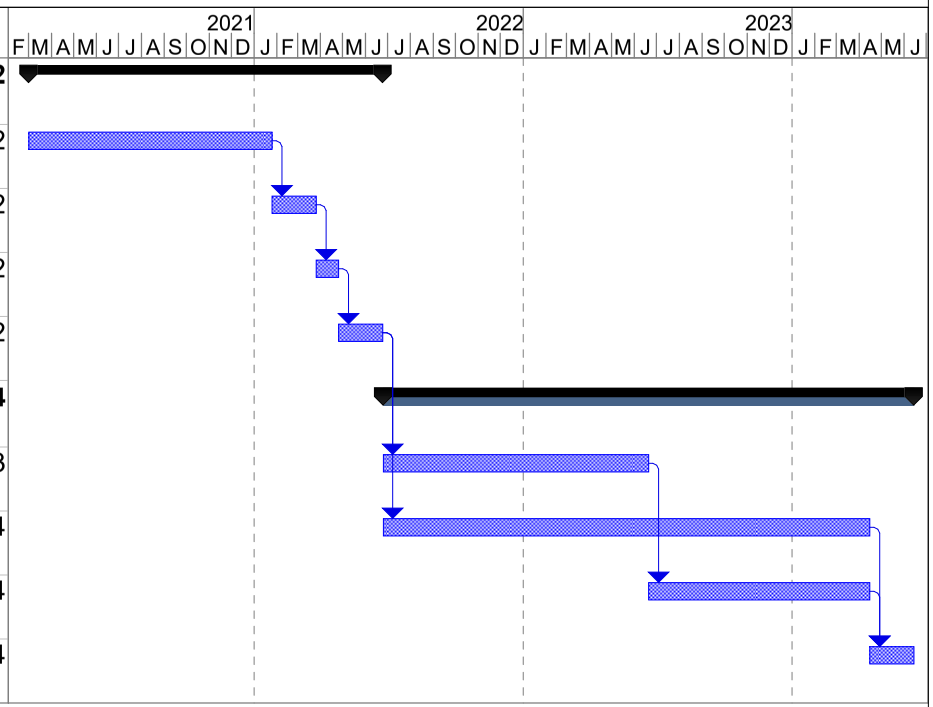
When approved by the Engineer, water services from curb box to meter may be placed in open trenches and will be measured and paid for per lineal foot for "__" Water Service", according to Division 19 of the Standard Construction Specifications from the water main to the building penetration, and includes furnishing and placing all piping, fittings, sand backfill and any incidental work required for the proper reconnection of the water services.

When water services outside the right of way are placed by open cut, the restoration of surface over the new water service will be paid for separately under the related items.

Appendix 4

2020 DWRF PROJECT PLAN - LMFP RESIDUALS HANDLING IMPROVEMENTS

ID	Task Name	Duration	Start	Finish
1	**Design and Bidding**	**16 mons**	**Mon 3/1/21**	**Thu 6/23/22**
2	Final Design	11 mons	Mon 3/1/21	Mon 1/24/22
3	Construction Permit	2 mons	Tue 1/25/22	Fri 3/25/22
4	Bidding	1 mon	Sat 3/26/22	Sun 4/24/22
5	DWRF Funding & Project Award	2 mons	Mon 4/25/22	Thu 6/23/22
6	**Construction Phase**	**24 mons**	**Sat 6/25/22**	**Thu 6/13/24**
7	Order and Receive Equipment	12 mons	Sat 6/25/22	Mon 6/19/23
8	Structural and Electrical	22 mons	Sat 6/25/22	Sun 4/14/24
9	Equipment Installation	10 mons	Tue 6/20/23	Sun 4/14/24
10	Startup and Place in Service	2 mons	Mon 4/15/24	Thu 6/13/24

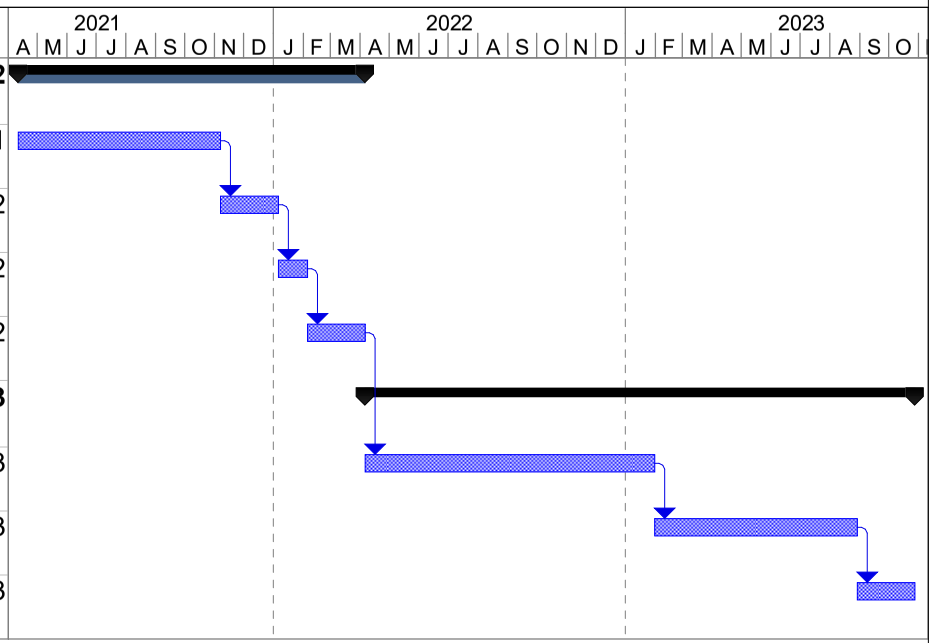


2020 DWRF Project Plan

Task		Inactive Task		Manual Summary	
Split		Inactive Task		Start-only	
Milestone		Inactive Milestone		Finish-only	
Summary		Inactive Summary		Progress	
Project Summary		Manual Task		Deadline	
External Tasks		Duration-only			
External Milestone		Manual Summary Rollup			

2020 DWRF PROJECT PLAN - FRANKLIN STREET PUMP STATION PUMP REPLACMENT

ID	Task Name	Duration	Start	Finish
1	**Design and Bidding**	**12 mons**	**Sun 4/11/21**	**Tue 4/5/22**
2	Final Design	7 mons	Sun 4/11/21	Sat 11/6/21
3	Construction Permit	2 mons	Sun 11/7/21	Wed 1/5/22
4	Bidding	1 mon	Thu 1/6/22	Fri 2/4/22
5	DWRF Funding & Project Award	2 mons	Sat 2/5/22	Tue 4/5/22
6	**Construction**	**19 mons**	**Wed 4/6/22**	**Fri 10/27/23**
7	Order and Receive Equipment	10 mons	Wed 4/6/22	Mon 1/30/23
8	Install Pumps and VFDs	7 mons	Tue 1/31/23	Mon 8/28/23
9	Startup and Place in Service	2 mons	Tue 8/29/23	Fri 10/27/23

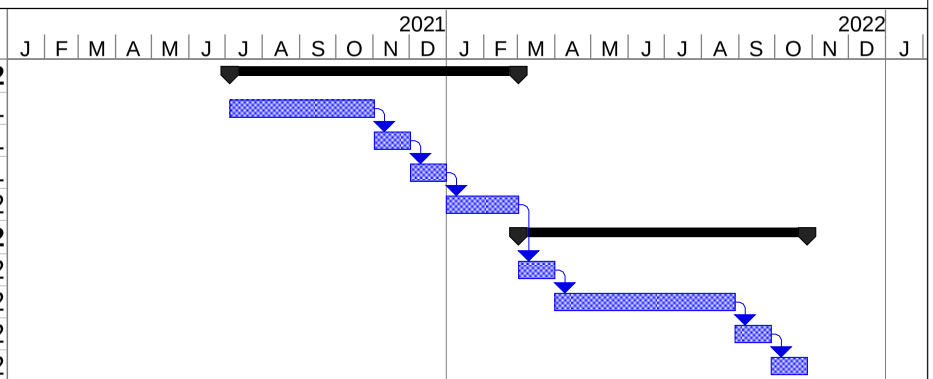


2020 DWRF Project Plan

Task		Inactive Task		Manual Summary	
Split		Inactive Task		Start-only	
Milestone		Inactive Milestone		Finish-only	
Summary		Inactive Summary		Progress	
Project Summary		Manual Task		Deadline	
External Tasks		Duration-only			
External Milestone		Manual Summary Rollup			

2020 DWRF PROJECT PLAN
COLLEGE AVENUE WATERMAIN
WATER DISTRIBUTION SYSTEM

ID	Task Name	Duration	Start	Finish
1	**Design and Bidding**	**8 mons**	**Mon 7/5/21**	**Tue 3/1/22**
2	Final Design	4 mons	Mon 7/5/21	Mon 11/1/21
3	Construction Permit	1 mon	Tue 11/2/21	Wed 12/1/21
4	Bidding	1 mon	Thu 12/2/21	Fri 12/31/21
5	DWRF Funding & Project Award	2 mons	Sat 1/1/22	Tue 3/1/22
6	**Construction Phase**	**8 mons**	**Wed 3/2/22**	**Thu 10/27/22**
7	Order and Receive Pipe	1 mon	Wed 3/2/22	Thu 3/31/22
8	Install Pipe	5 mons	Fri 4/1/22	Sun 8/28/22
9	Surface Restoration	1 mon	Mon 8/29/22	Tue 9/27/22
10	Disinfect and Place in Service	1 mon	Wed 9/28/22	Thu 10/27/22

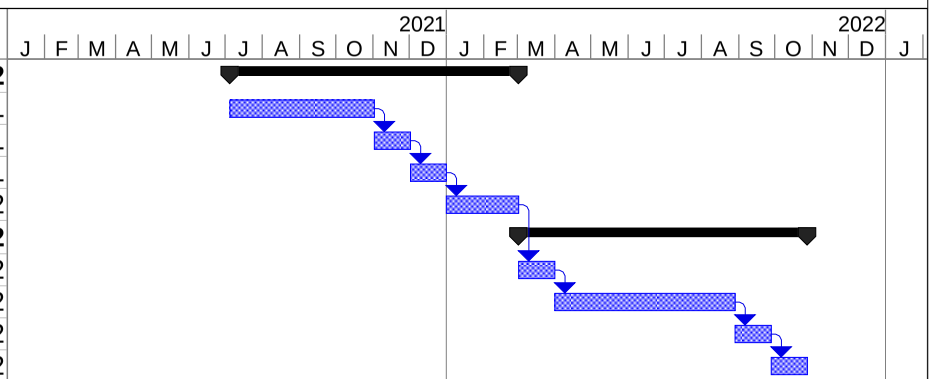


2020 DWRF Project Plan
Date: Thu 2/6/20

Task
Split
Milestone
Summary
Project Summary
External Tasks
External Milestone
Inactive Task
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
Progress
Deadline

2020 DWRF PROJECT PLAN
STRAIGHT AVENUE SW AND WEALTHY STREET SW WATERMAIN
WATER DISTRIBUTION SYSTEM

ID	Task Name	Duration	Start	Finish
1	**Design and Bidding**	**8 mons**	**Mon 7/5/21**	**Tue 3/1/22**
2	Final Design	4 mons	Mon 7/5/21	Mon 11/1/21
3	Construction Permit	1 mon	Tue 11/2/21	Wed 12/1/21
4	Bidding	1 mon	Thu 12/2/21	Fri 12/31/21
5	DWRF Funding & Project Award	2 mons	Sat 1/1/22	Tue 3/1/22
6	**Construction Phase**	**8 mons**	**Wed 3/2/22**	**Thu 10/27/22**
7	Order and Receive Pipe	1 mon	Wed 3/2/22	Thu 3/31/22
8	Install Pipe	5 mons	Fri 4/1/22	Sun 8/28/22
9	Surface Restoration	1 mon	Mon 8/29/22	Tue 9/27/22
10	Disinfect and Place in Service	1 mon	Wed 9/28/22	Thu 10/27/22

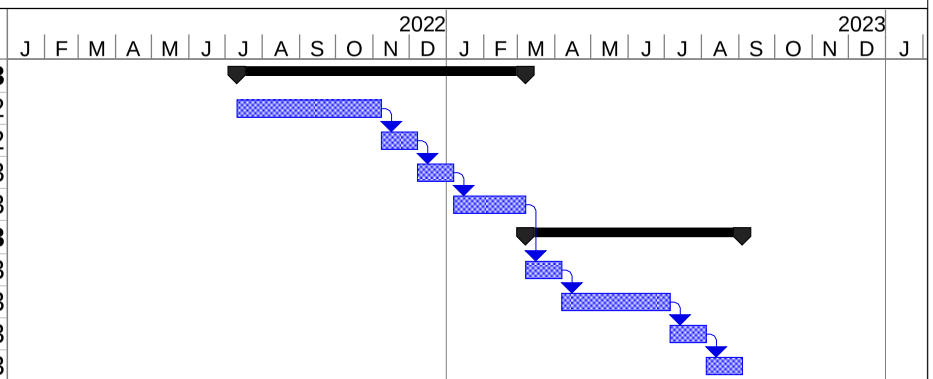


2020 DWRF Project Plan
Date: Thu 2/6/20

Task
Split
Milestone
Summary
Project Summary
External Tasks
External Milestone
Inactive Task
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
Progress
Deadline

2020 DWRF PROJECT PLAN
PAGE, CARRIER, LISTER AND PLAINFIELD IMPROVEMENTS
WATER DISTRIBUTION SYSTEM

ID	Task Name	Duration	Start	Finish
1	**Design and Bidding**	**8 mons**	**Mon 7/11/22**	**Tue 3/7/23**
2	Final Design	4 mons	Mon 7/11/22	Mon 11/7/22
3	Construction Permit	1 mon	Tue 11/8/22	Wed 12/7/22
4	Bidding	1 mon	Thu 12/8/22	Fri 1/6/23
5	DWRF Funding & Project Award	2 mons	Sat 1/7/23	Tue 3/7/23
6	**Construction Phase**	**6 mons**	**Wed 3/8/23**	**Sun 9/3/23**
7	Order and Receive Pipe	1 mon	Wed 3/8/23	Thu 4/6/23
8	Install Pipe	3 mons	Fri 4/7/23	Wed 7/5/23
9	Surface Restoration	1 mon	Thu 7/6/23	Fri 8/4/23
10	Disinfect and Place in Service	1 mon	Sat 8/5/23	Sun 9/3/23

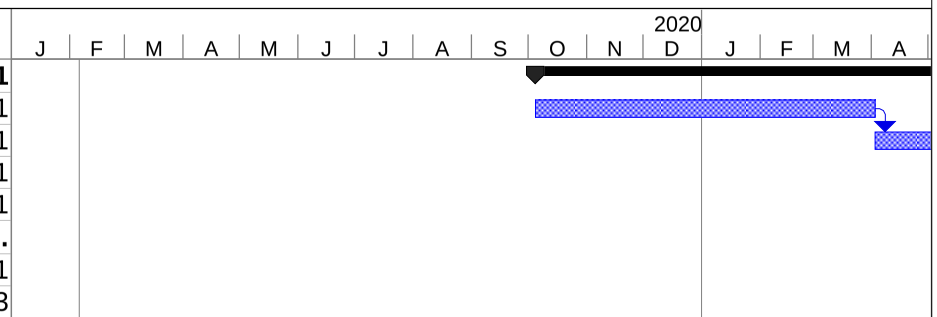


2020 DWRF Project Plan
Date: Thu 2/6/20

Task		Inactive Task		Manual Summary	
Split		Inactive Task		Start-only	
Milestone		Inactive Milestone		Finish-only	
Summary		Inactive Summary		Progress	
Project Summary		Manual Task		Deadline	
External Tasks		Duration-only			
External Milestone		Manual Summary Rollup			

2020 DWRF PROJECT PLAN
PRIVATE LEAD SERVICE LINE REPLACEMENT
WATER DISTRIBUTION SYSTEM

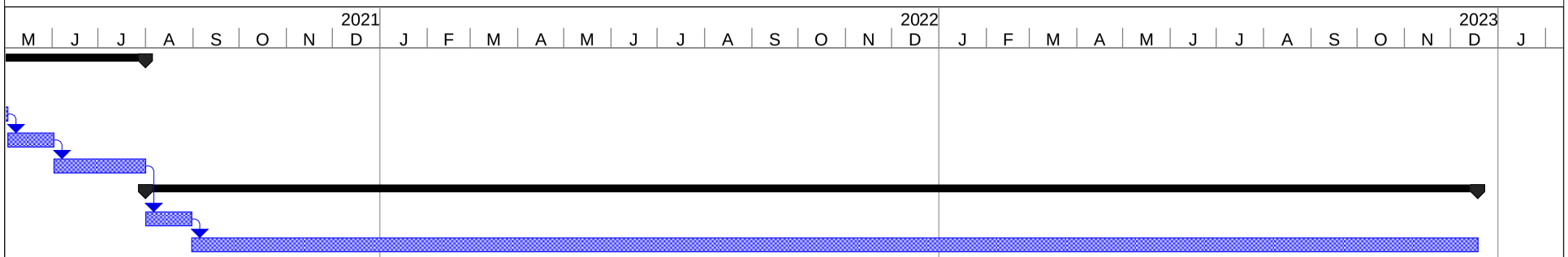
ID	Task Name	Duration	Start	Finish
1	**Design and Bidding**	**10 mons**	**Mon 10/5/20**	**Sat 7/31/21**
2	Final Design	6 mons	Mon 10/5/20	Fri 4/2/21
3	Construction Permit	1 mon	Sat 4/3/21	Sun 5/2/21
4	Bidding	1 mon	Mon 5/3/21	Tue 6/1/21
5	DWRF Funding & Project Award	2 mons	Wed 6/2/21	Sat 7/31/21
6	**Construction Phase**	**29 mons**	**Sun 8/1/21**	**Mon 12/18/...**
7	Order and Receive Pipe	1 mon	Sun 8/1/21	Mon 8/30/21
8	Water Service Replacement	28 mons	Tue 8/31/21	Mon 12/18/23



2020 DWRF Project Plan
Date: Thu 2/6/20

Task		Inactive Task		Manual Summary	
Split		Inactive Task		Start-only	
Milestone		Inactive Milestone		Finish-only	
Summary		Inactive Summary		Progress	
Project Summary		Manual Task		Deadline	
External Tasks		Duration-only			
External Milestone		Manual Summary Rollup			

2020 DWRF PROJECT PLAN
PRIVATE LEAD SERVICE LINE REPLACEMENT
WATER DISTRIBUTION SYSTEM

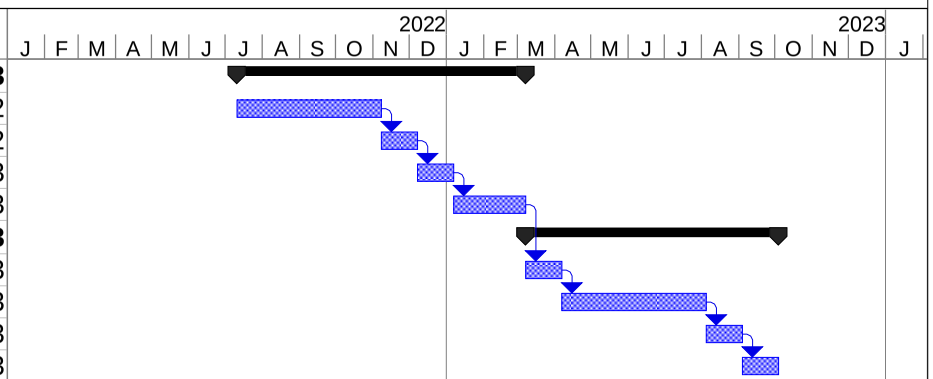


2020 DWRF Project Plan
Date: Thu 2/6/20

Task		Inactive Task		Manual Summary	
Split		Inactive Task		Start-only	
Milestone		Inactive Milestone		Finish-only	
Summary		Inactive Summary		Progress	
Project Summary		Manual Task		Deadline	
External Tasks		Duration-only			
External Milestone		Manual Summary Rollup			

2020 DWRF PROJECT PLAN
GIDDINGS AVENUE WATERMAIN
WATER DISTRIBUTION SYSTEM

ID	Task Name	Duration	Start	Finish
1	**Design and Bidding**	**8 mons**	**Mon 7/11/22**	**Tue 3/7/23**
2	Final Design	4 mons	Mon 7/11/22	Mon 11/7/22
3	Construction Permit	1 mon	Tue 11/8/22	Wed 12/7/22
4	Bidding	1 mon	Thu 12/8/22	Fri 1/6/23
5	DWRF Funding & Project Award	2 mons	Sat 1/7/23	Tue 3/7/23
6	**Construction Phase**	**7 mons**	**Wed 3/8/23**	**Tue 10/3/23**
7	Order and Receive Pipe	1 mon	Wed 3/8/23	Thu 4/6/23
8	Install Pipe	4 mons	Fri 4/7/23	Fri 8/4/23
9	Surface Restoration	1 mon	Sat 8/5/23	Sun 9/3/23
10	Disinfect and Place in Service	1 mon	Mon 9/4/23	Tue 10/3/23

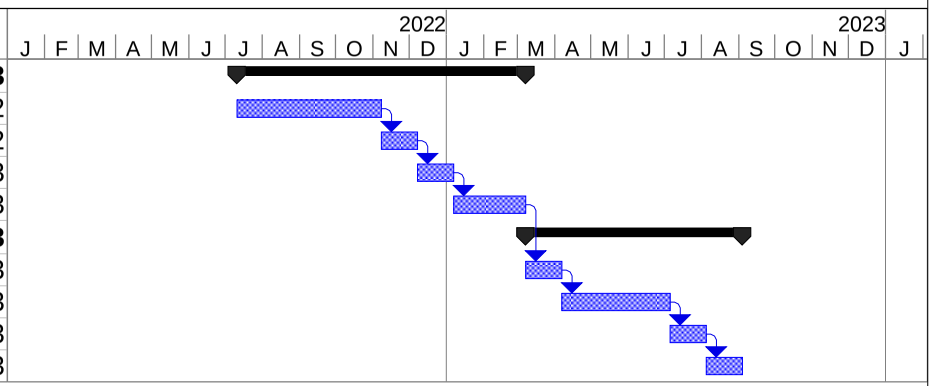


2020 DWRF Project Plan
Date: Thu 2/6/20

Task	Inactive Task	Manual Summary	
Split	Inactive Task	Start-only	
Milestone	Inactive Milestone	Finish-only	
Summary	Inactive Summary	Progress	
Project Summary	Manual Task	Deadline	
External Tasks	Duration-only		
External Milestone	Manual Summary Rollup		

2020 DWRF PROJECT PLAN
ELEANOR STREET WATERMAIN
WATER DISTRIBUTION SYSTEM

ID	Task Name	Duration	Start	Finish
1	**Design and Bidding**	**8 mons**	**Mon 7/11/22**	**Tue 3/7/23**
2	Final Design	4 mons	Mon 7/11/22	Mon 11/7/22
3	Construction Permit	1 mon	Tue 11/8/22	Wed 12/7/22
4	Bidding	1 mon	Thu 12/8/22	Fri 1/6/23
5	DWRF Funding & Project Award	2 mons	Sat 1/7/23	Tue 3/7/23
6	**Construction Phase**	**6 mons**	**Wed 3/8/23**	**Sun 9/3/23**
7	Order and Receive Pipe	1 mon	Wed 3/8/23	Thu 4/6/23
8	Install Pipe	3 mons	Fri 4/7/23	Wed 7/5/23
9	Surface Restoration	1 mon	Thu 7/6/23	Fri 8/4/23
10	Disinfect and Place in Service	1 mon	Sat 8/5/23	Sun 9/3/23

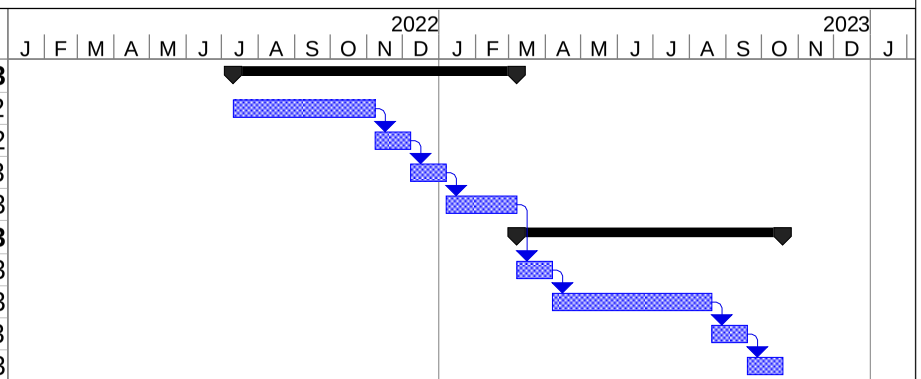


2020 DWRF Project Plan
Date: Thu 2/6/20

Task		Inactive Task		Manual Summary	
Split		Inactive Task		Start-only	
Milestone		Inactive Milestone		Finish-only	
Summary		Inactive Summary		Progress	
Project Summary		Manual Task		Deadline	
External Tasks		Duration-only			
External Milestone		Manual Summary Rollup			

2020 DWRF PROJECT PLAN
PLAINFIELD AVENUE WATERMAIN
WATER DISTRIBUTION SYSTEM

ID	Task Name	Duration	Start	Finish
1	**Design and Bidding**	**8 mons**	**Mon 7/11/22**	**Tue 3/7/23**
2	Final Design	4 mons	Mon 7/11/22	Mon 11/7/22
3	Construction Permit	1 mon	Tue 11/8/22	Wed 12/7/22
4	Bidding	1 mon	Thu 12/8/22	Fri 1/6/23
5	DWRF Funding & Project Award	2 mons	Sat 1/7/23	Tue 3/7/23
6	**Construction Phase**	**7.5 mons**	**Wed 3/8/23**	**Wed 10/18/23**
7	Order and Receive Pipe	1 mon	Wed 3/8/23	Thu 4/6/23
8	Install Pipe	4.5 mons	Fri 4/7/23	Sat 8/19/23
9	Surface Restoration	1 mon	Sun 8/20/23	Mon 9/18/23
10	Disinfect and Place in Service	1 mon	Tue 9/19/23	Wed 10/18/23

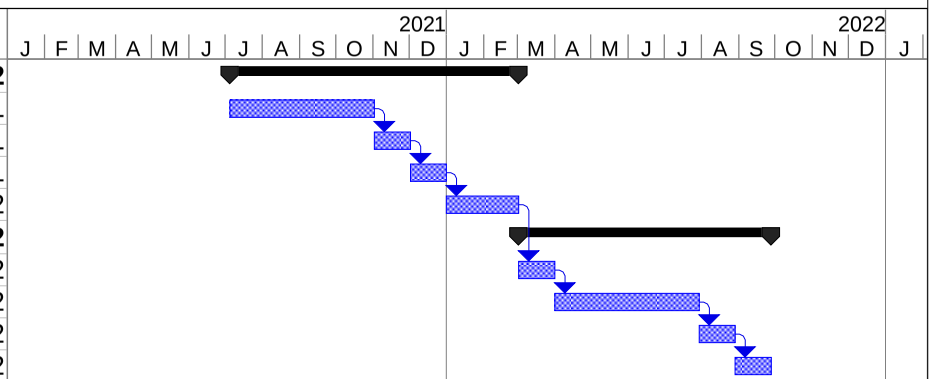


2020 DWRF Project Plan
Date: Thu 2/6/20

Task	Inactive Task	Manual Summary	
Split	Inactive Task	Start-only	
Milestone	Inactive Milestone	Finish-only	
Summary	Inactive Summary	Progress	
Project Summary	Manual Task	Deadline	
External Tasks	Duration-only		
External Milestone	Manual Summary Rollup		

2020 DWRF PROJECT PLAN
GARFIELD AVENUE WATERMAIN
WATER DISTRIBUTION SYSTEM

ID	Task Name	Duration	Start	Finish
1	**Design and Bidding**	**8 mons**	**Mon 7/5/21**	**Tue 3/1/22**
2	Final Design	4 mons	Mon 7/5/21	Mon 11/1/21
3	Construction Permit	1 mon	Tue 11/2/21	Wed 12/1/21
4	Bidding	1 mon	Thu 12/2/21	Fri 12/31/21
5	DWRF Funding & Project Award	2 mons	Sat 1/1/22	Tue 3/1/22
6	**Construction Phase**	**7 mons**	**Wed 3/2/22**	**Tue 9/27/22**
7	Order and Receive Pipe	1 mon	Wed 3/2/22	Thu 3/31/22
8	Install Pipe	4 mons	Fri 4/1/22	Fri 7/29/22
9	Surface Restoration	1 mon	Sat 7/30/22	Sun 8/28/22
10	Disinfect and Place in Service	1 mon	Mon 8/29/22	Tue 9/27/22



2020 DWRF Project Plan
Date: Thu 2/6/20

Task
Split
Milestone
Summary
Project Summary
External Tasks
External Milestone
Inactive Task
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
Progress
Deadline

Appendix 5

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1515 Arboretum Drive, SE
Grand Rapids, Michigan 49546

616.575.3824 | fishbeck.com

March 12, 2020
Project No. 190666

Mr. Earl Meshigaud
THPO
Hannahville Potawatomi Indian Community
N-14911 Hannahville B-1 Road
Wilson, MI 49896

Grand Rapids DWRF Project Plan

Dear Mr. Meshigaud:

Fishbeck, working on behalf of the City of Grand Rapids, is preparing an application to fund improvements to the City's water system. This work is proposed for funding through the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Drinking Water Revolving Fund (DWRF), starting in the fiscal year 2021.

The proposed work includes improvements at the Lake Michigan Filtration Plan (LMFP), the Franklin Street Pump Station, and eight individual projects within the water distribution system serving Grand Rapids and the surrounding communities. The projects will be in Kent County; please refer to the attached maps, which detail the areas affected by the proposed construction and the location of each project using the Congressional Land Survey System. A description of the proposed projects is provided below.

LMFP Residuals Handling System Improvements (T7N, R16W, Section 28)

The improvements at the LMFP will provide the necessary treatment of the solids generated at the LMFP while optimizing reliability, energy use, and space utilization. Proposed construction will occur inside the existing buildings at the LMFP property, with limited work occurring outside of the building in the proximity of the building footprints.

Franklin Street Pump Station Pump Replacement (T7N, R11W, Section 32)

The improvements at the Franklin Street Pump Station will optimize the reliability of the station by providing variable frequency drives for the pumps. The proposed project will occur within the existing structure.

College Avenue Water Main (T7N, R11W, Section 18)

The College Avenue Water Main project will include the installation of a new 6- and 8-inch water main and water services. The project, which will occur in an area of previous construction, is intended to address the concern of water main age, dead-end line operation and maintenance, and lead service compliance.

Straight Avenue SW and Wealthy Street SW Water Main (T7N, R12W, Section 25 and 26)

The proposed Straight Avenue SW and Wealthy Street SW Water Main project will include the installation of a new 12-inch water main and water services. The project will occur in an area of previous construction and will address the concern of water main age and lead service compliance while accounting for projected 20-year growth.

Page, Carrier, Lister, and Plainfield Improvements (T7N, R11W, Section 18)

The Page, Carrier, Lister, and Plainfield Improvements project proposes the installation of a new 6- and 8-inch water main and water services. The project will address aging infrastructure, stagnant water caused by dead-end lines, and lead service compliance. The project will occur in an area of previous construction.

Private Lead Service Line Replacement (T7N, R11W, Section 31 and 32)

The Private Lead Service Line Replacement proposed the installation of new water services to replace existing lead services in an area where the water service is copper from the water main to the property line and lead from the property line to the building. The project will occur in areas of previous construction.

Giddings Avenue Water Main (T6N, R11W, Section 5)

The proposed Giddings Avenue Water Main improvements include the installation of a new 8-inch water main and water services. This project will address the concerns water main age and lead service compliance and will occur in an area of previous construction.

Eleanor Street Water Main (T7N, R11W, Section 18)

New 6- and 8-inch water mains and services are proposed for Eleanor Street in order to address concerns of aging infrastructure, dead-end line operation and maintenance, and lead service compliance. The project will occur a previous construction area.

Plainfield Avenue Water Main (T7N, R11W, Section 7 and 8)

The proposed Plainfield Avenue Water Main improvements include the installation of new 8- and 12-inch water mains in order to alleviate concerns of water main age and stagnant water due to dead-end lines. The project will occur within the existing road right-of-way in a previous construction area.

Garfield Avenue Water Main (T7N, R12W, Section 26)

New 6- and 8-inch water main and water services are proposed for a portion of Garfield Avenue to address concerns of aging water main and lead service compliance. The project will occur a previous construction area.

This notice and opportunity to comment is being sent to you to fulfill Section 106 of the National Historic Preservation Act review process, which requires a federal agency or applicant to consult with THPOs and federally recognized Indian tribes. The purpose of this notice is to give you an opportunity to have your interests and concerns considered. Should you have any comments on potential impacts to known religious and/or culturally significant properties in the areas of the proposed projects, please provide them to us within 30 days of this notice. If you have any questions or require additional information, please contact me at 616.464.3737 or dnyoon@fishbeck.com.

Sincerely,

Danielle N. Yoon

Danielle N. Yoon, PE
Civil Engineer

Attachments
By FedEx

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1515 Arboretum Drive, SE
Grand Rapids, Michigan 49546

616.575.3824 | fishbeck.com

March 12, 2020
Project No. 190666

Mr. Jay Sam
Director
Little River Band of Ottawa Indians
2608 Governmental Center Drive
Manistee, MI 49660

Grand Rapids DWRF Project Plan

Dear Mr. Sam:

Fishbeck, working on behalf of the City of Grand Rapids, is preparing an application to fund improvements to the City's water system. This work is proposed for funding through the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Drinking Water Revolving Fund (DWRF), starting in the fiscal year 2021.

The proposed work includes improvements at the Lake Michigan Filtration Plan (LMFP), the Franklin Street Pump Station, and eight individual projects within the water distribution system serving Grand Rapids and the surrounding communities. The projects will be in Kent County; please refer to the attached maps, which detail the areas affected by the proposed construction and the location of each project using the Congressional Land Survey System. A description of the proposed projects is provided below.

LMFP Residuals Handling System Improvements (T7N, R16W, Section 28)

The improvements at the LMFP will provide the necessary treatment of the solids generated at the LMFP while optimizing reliability, energy use, and space utilization. Proposed construction will occur inside the existing buildings at the LMFP property, with limited work occurring outside of the building in the proximity of the building footprints.

Franklin Street Pump Station Pump Replacement (T7N, R11W, Section 32)

The improvements at the Franklin Street Pump Station will optimize the reliability of the station by providing variable frequency drives for the pumps. The proposed project will occur within the existing structure.

College Avenue Water Main (T7N, R11W, Section 18)

The College Avenue Water Main project will include the installation of a new 6- and 8-inch water main and water services. The project, which will occur in an area of previous construction, is intended to address the concern of water main age, dead-end line operation and maintenance, and lead service compliance.

Straight Avenue SW and Wealthy Street SW Water Main (T7N, R12W, Section 25 and 26)

The proposed Straight Avenue SW and Wealthy Street SW Water Main project will include the installation of a new 12-inch water main and water services. The project will occur in an area of previous construction and will address the concern of water main age and lead service compliance while accounting for projected 20-year growth.

Page, Carrier, Lister, and Plainfield Improvements (T7N, R11W, Section 18)

The Page, Carrier, Lister, and Plainfield Improvements project proposes the installation of a new 6- and 8-inch water main and water services. The project will address aging infrastructure, stagnant water caused by dead-end lines, and lead service compliance. The project will occur in an area of previous construction.

Private Lead Service Line Replacement (T7N, R11W, Section 31 and 32)

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Giddings Avenue Water Main (T6N, R11W, Section 5)

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Eleanor Street Water Main (T7N, R11W, Section 18)

New 6- and 8-inch water mains and services are proposed for Eleanor Street in order to address concerns of aging infrastructure, dead-end line operation and maintenance, and lead service compliance. The project will occur a previous construction area.

Plainfield Avenue Water Main (T7N, R11W, Section 7 and 8)

The proposed Plainfield Avenue Water Main improvements include the installation of new 8- and 12-inch water mains in order to alleviate concerns of water main age and stagnant water due to dead-end lines. The project will occur within the existing road right-of-way in a previous construction area.

Garfield Avenue Water Main (T7N, R12W, Section 26)

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Sincerely,

Danielle N. Yoon

Danielle N. Yoon, PE
Civil Engineer

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Grand Rapids, Michigan 49546

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March 12, 2020
Project No. 190666

Ms. Heather Bush
MGLB of Potawatomi Indians
2872 Mission Drive
Shelbyville, MI 49344

Grand Rapids DWRF Project Plan

Dear Ms. Bush:

Fishbeck, working on behalf of the City of Grand Rapids, is preparing an application to fund improvements to the City's water system. This work is proposed for funding through the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Drinking Water Revolving Fund (DWRF), starting in the fiscal year 2021.

The proposed work includes improvements at the Lake Michigan Filtration Plan (LMFP), the Franklin Street Pump Station, and eight individual projects within the water distribution system serving Grand Rapids and the surrounding communities. The projects will be in Kent County; please refer to the attached maps, which detail the areas affected by the proposed construction and the location of each project using the Congressional Land Survey System. A description of the proposed projects is provided below.

LMFP Residuals Handling System Improvements (T7N, R16W, Section 28)

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Eleanor Street Water Main (T7N, R11W, Section 18)

New 6- and 8-inch water mains and services are proposed for Eleanor Street in order to address concerns of aging infrastructure, dead-end line operation and maintenance, and lead service compliance. The project will occur a previous construction area.

Plainfield Avenue Water Main (T7N, R11W, Section 7 and 8)

The proposed Plainfield Avenue Water Main improvements include the installation of new 8- and 12-inch water mains in order to alleviate concerns of water main age and stagnant water due to dead-end lines. The project will occur within the existing road right-of-way in a previous construction area.

Garfield Avenue Water Main (T7N, R12W, Section 26)

New 6- and 8-inch water main and water services are proposed for a portion of Garfield Avenue to address concerns of aging water main and lead service compliance. The project will occur a previous construction area.

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Sincerely,

Danielle N. Yoon

Danielle N. Yoon, PE
Civil Engineer

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1515 Arboretum Drive, SE
Grand Rapids, Michigan 49546

616.575.3824 | fishbeck.com

March 12, 2020
Project No. 190666

Ms. Mon-ee Zapata
Cultural Specialist
Nottawaseppi Band of Huron Potawatomi
1485 Mno-Bmadzewen Way
Fulton, MI 49052

Grand Rapids DWRF Project Plan

Dear Ms. Zapata:

Fishbeck, working on behalf of the City of Grand Rapids, is preparing an application to fund improvements to the City's water system. This work is proposed for funding through the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Drinking Water Revolving Fund (DWRF), starting in the fiscal year 2021.

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The improvements at the LMFP will provide the necessary treatment of the solids generated at the LMFP while optimizing reliability, energy use, and space utilization. Proposed construction will occur inside the existing buildings at the LMFP property, with limited work occurring outside of the building in the proximity of the building footprints.

Franklin Street Pump Station Pump Replacement (T7N, R11W, Section 32)

The improvements at the Franklin Street Pump Station will optimize the reliability of the station by providing variable frequency drives for the pumps. The proposed project will occur within the existing structure.

College Avenue Water Main (T7N, R11W, Section 18)

The College Avenue Water Main project will include the installation of a new 6- and 8-inch water main and water services. The project, which will occur in an area of previous construction, is intended to address the concern of water main age, dead-end line operation and maintenance, and lead service compliance.

Straight Avenue SW and Wealthy Street SW Water Main (T7N, R12W, Section 25 and 26)

The proposed Straight Avenue SW and Wealthy Street SW Water Main project will include the installation of a new 12-inch water main and water services. The project will occur in an area of previous construction and will address the concern of water main age and lead service compliance while accounting for projected 20-year growth.

Page, Carrier, Lister, and Plainfield Improvements (T7N, R11W, Section 18)

The Page, Carrier, Lister, and Plainfield Improvements project proposes the installation of a new 6- and 8-inch water main and water services. The project will address aging infrastructure, stagnant water caused by dead-end lines, and lead service compliance. The project will occur in an area of previous construction.

Private Lead Service Line Replacement (T7N, R11W, Section 31 and 32)

The Private Lead Service Line Replacement proposed the installation of new water services to replace existing lead services in an area where the water service is copper from the water main to the property line and lead from the property line to the building. The project will occur in areas of previous construction.

Giddings Avenue Water Main (T6N, R11W, Section 5)

The proposed Giddings Avenue Water Main improvements include the installation of a new 8-inch water main and water services. This project will address the concerns water main age and lead service compliance and will occur in an area of previous construction.

Eleanor Street Water Main (T7N, R11W, Section 18)

New 6- and 8-inch water mains and services are proposed for Eleanor Street in order to address concerns of aging infrastructure, dead-end line operation and maintenance, and lead service compliance. The project will occur a previous construction area.

Plainfield Avenue Water Main (T7N, R11W, Section 7 and 8)

The proposed Plainfield Avenue Water Main improvements include the installation of new 8- and 12-inch water mains in order to alleviate concerns of water main age and stagnant water due to dead-end lines. The project will occur within the existing road right-of-way in a previous construction area.

Garfield Avenue Water Main (T7N, R12W, Section 26)

New 6- and 8-inch water main and water services are proposed for a portion of Garfield Avenue to address concerns of aging water main and lead service compliance. The project will occur a previous construction area.

This notice and opportunity to comment is being sent to you to fulfill Section 106 of the National Historic Preservation Act review process, which requires a federal agency or applicant to consult with THPOs and federally recognized Indian tribes. The purpose of this notice is to give you an opportunity to have your interests and concerns considered. Should you have any comments on potential impacts to known religious and/or culturally significant properties in the areas of the proposed projects, please provide them to us within 30 days of this notice. If you have any questions or require additional information, please contact me at 616.464.3737 or dnyoon@fishbeck.com.

Sincerely,

Danielle N. Yoon

Danielle N. Yoon, PE
Civil Engineer

Attachments
By UPS

fishbeck
Engineers | Architects | Scientists | Constructors

1515 Arboretum Drive, SE
Grand Rapids, Michigan 49546

616.575.3824 | fishbeck.com

March 12, 2020
Project No. 190666

Mr. Marcus Winchester
THPO
Pokagon Band of Potawatomi
58620 Sink Road
Dowagiac, MI 49047

Grand Rapids DWRF Project Plan

Dear Mr. Winchester:

Fishbeck, working on behalf of the City of Grand Rapids, is preparing an application to fund improvements to the City's water system. This work is proposed for funding through the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Drinking Water Revolving Fund (DWRF), starting in the fiscal year 2021.

The proposed work includes improvements at the Lake Michigan Filtration Plan (LMFP), the Franklin Street Pump Station, and eight individual projects within the water distribution system serving Grand Rapids and the surrounding communities. The projects will be in Kent County; please refer to the attached maps, which detail the areas affected by the proposed construction and the location of each project using the Congressional Land Survey System. A description of the proposed projects is provided below.

LMFP Residuals Handling System Improvements (T7N, R16W, Section 28)

The improvements at the LMFP will provide the necessary treatment of the solids generated at the LMFP while optimizing reliability, energy use, and space utilization. Proposed construction will occur inside the existing buildings at the LMFP property, with limited work occurring outside of the building in the proximity of the building footprints.

Franklin Street Pump Station Pump Replacement (T7N, R11W, Section 32)

The improvements at the Franklin Street Pump Station will optimize the reliability of the station by providing variable frequency drives for the pumps. The proposed project will occur within the existing structure.

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Straight Avenue SW and Wealthy Street SW Water Main (T7N, R12W, Section 25 and 26)

The proposed Straight Avenue SW and Wealthy Street SW Water Main project will include the installation of a new 12-inch water main and water services. The project will occur in an area of previous construction and will address the concern of water main age and lead service compliance while accounting for projected 20-year growth.

Page, Carrier, Lister, and Plainfield Improvements (T7N, R11W, Section 18)

The Page, Carrier, Lister, and Plainfield Improvements project proposes the installation of a new 6- and 8-inch water main and water services. The project will address aging infrastructure, stagnant water caused by dead-end lines, and lead service compliance. The project will occur in an area of previous construction.

Private Lead Service Line Replacement (T7N, R11W, Section 31 and 32)

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Giddings Avenue Water Main (T6N, R11W, Section 5)

The proposed Giddings Avenue Water Main improvements include the installation of a new 8-inch water main and water services. This project will address the concerns water main age and lead service compliance and will occur in an area of previous construction.

Eleanor Street Water Main (T7N, R11W, Section 18)

New 6- and 8-inch water mains and services are proposed for Eleanor Street in order to address concerns of aging infrastructure, dead-end line operation and maintenance, and lead service compliance. The project will occur a previous construction area.

Plainfield Avenue Water Main (T7N, R11W, Section 7 and 8)

The proposed Plainfield Avenue Water Main improvements include the installation of new 8- and 12-inch water mains in order to alleviate concerns of water main age and stagnant water due to dead-end lines. The project will occur within the existing road right-of-way in a previous construction area.

Garfield Avenue Water Main (T7N, R12W, Section 26)

New 6- and 8-inch water main and water services are proposed for a portion of Garfield Avenue to address concerns of aging water main and lead service compliance. The project will occur a previous construction area.

This notice and opportunity to comment is being sent to you to fulfill Section 106 of the National Historic Preservation Act review process, which requires a federal agency or applicant to consult with THPOs and federally recognized Indian tribes. The purpose of this notice is to give you an opportunity to have your interests and concerns considered. Should you have any comments on potential impacts to known religious and/or culturally significant properties in the areas of the proposed projects, please provide them to us within 30 days of this notice. If you have any questions or require additional information, please contact me at 616.464.3737 or dnyoon@fishbeck.com.

Sincerely,

Danielle N. Yoon

Danielle N. Yoon, PE
Civil Engineer

Attachments
By UPS

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LEGEND

Area of Potential Effect

NORTH

AREA OF POTENTIAL EFFECT
FRANKLIN STREET PUMP STATION PUMP REPLACEMENT

0 100 200 FEET

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City of Grand Rapids
Kent County, Michigan

DWRF Agency Review

PROJECT NO.
190666

FIGURE NO.
1.1

PLOT INFO: Z:\190666 City of Grand Rapids\GIS\MapDoc\DWRF Project Plan\SHPO_APE_Franklin St Pump Station Pump Replacement.mxd Date: 3/10/2020 2:08:13 PM User: prbaskins

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PLOT INFO: Z:\190666 City of Grand Rapids\GIS\MapDoc\DWRF Project Plan\SHPO_APE_USGS_Quadrangle_Franklin St Pump Station Pump Replacement.mxd Date: 3/11/2020 8:36:15 AM User: prbaskins

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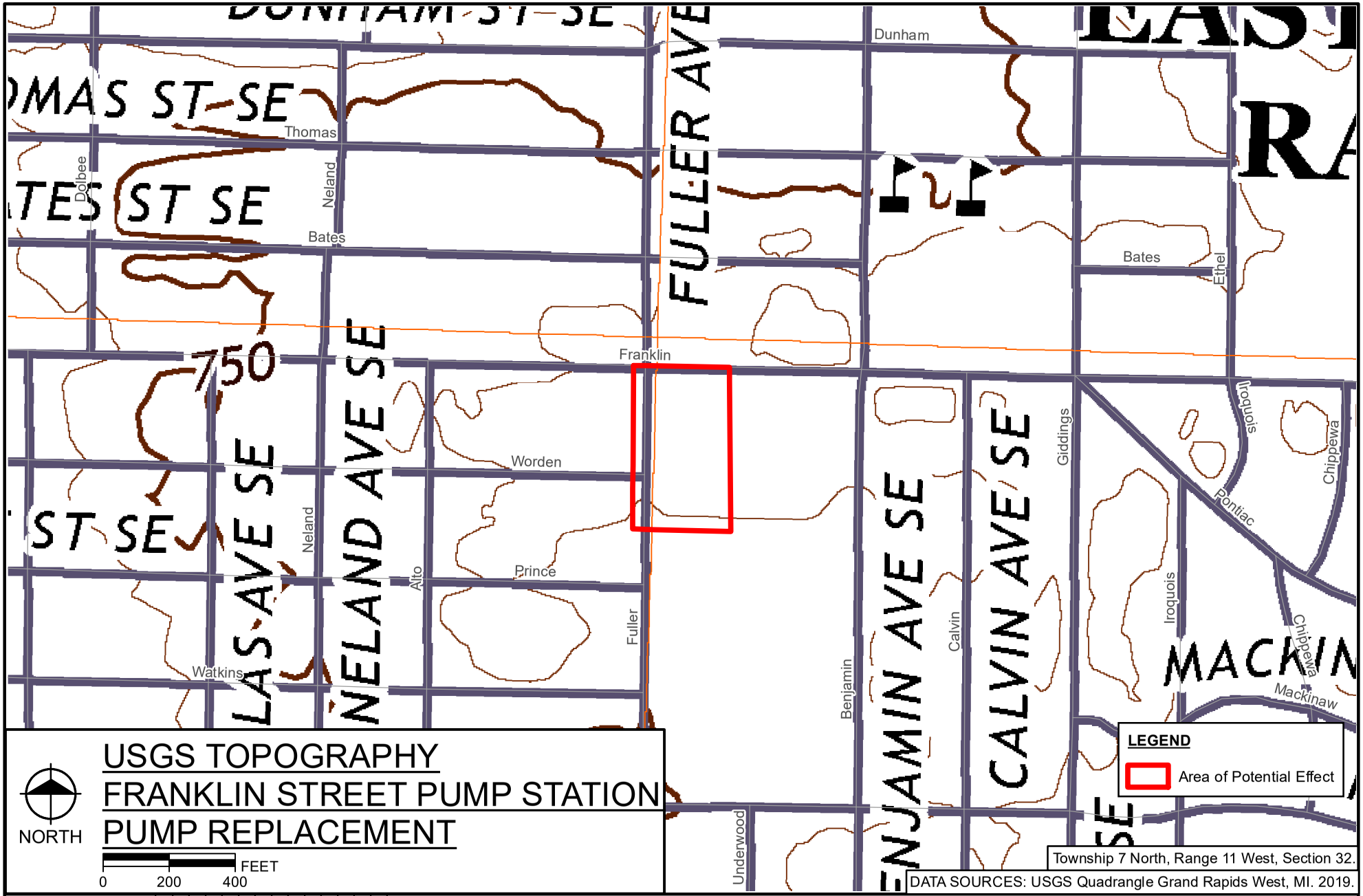

USGS TOPOGRAPHY
FRANKLIN STREET PUMP STATION
PUMP REPLACEMENT

Township 7 North, Range 11 West, Section 32.

DATA SOURCES: USGS Quadrangle Grand Rapids West, MI. 2019.

FIGURE NO. 1.2

PROJECT NO. 190666

City of Grand Rapids
Kent County, Michigan

DWRF Agency Review

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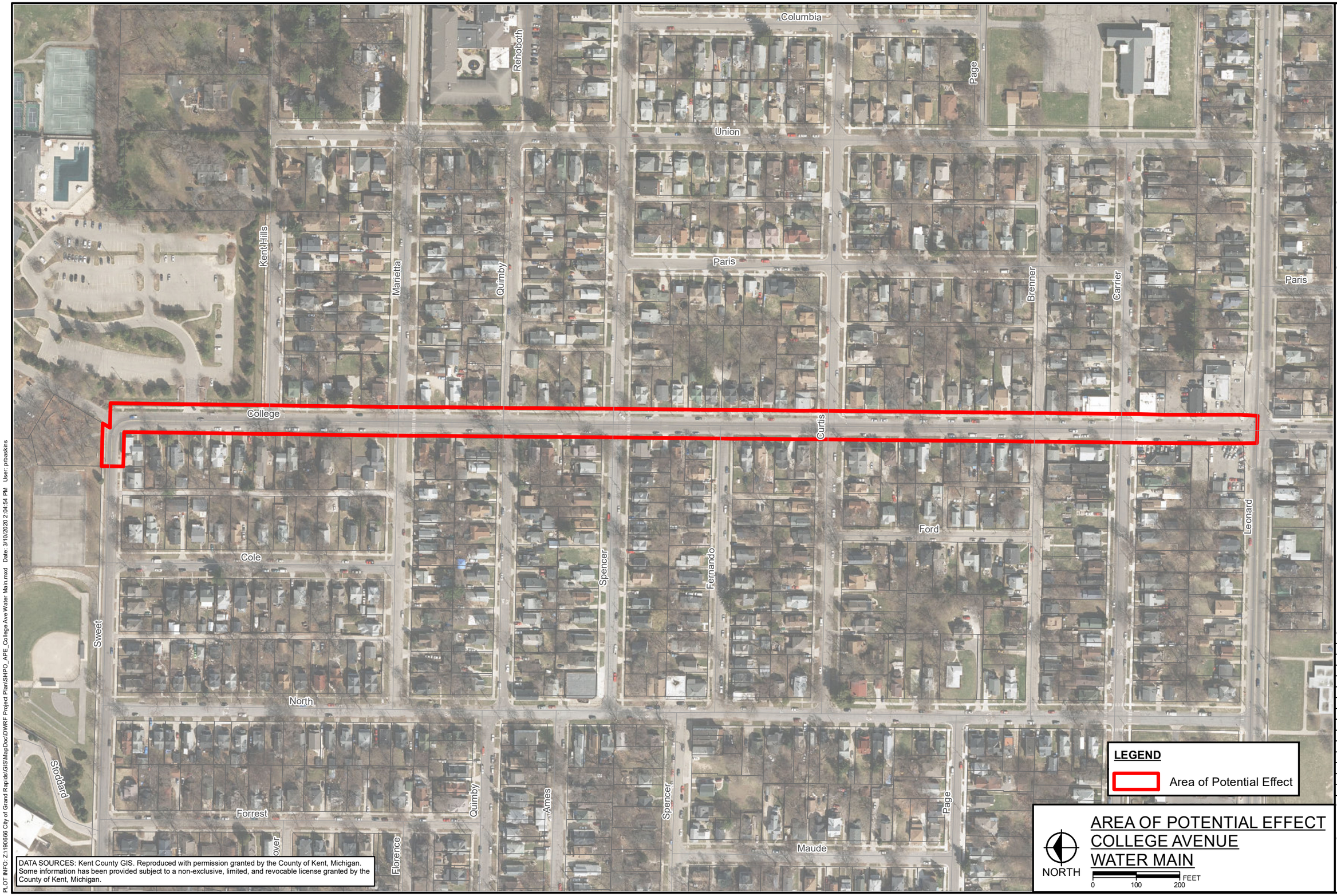

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City of Grand Rapids
Kent County, Michigan

DWRF Agency Review

PROJECT NO.
190666

FIGURE NO.
2.1

PLOT INFO: Z:\190666 City of Grand Rapids\GIS\MapDoc\DWRF Project Plan\SHPO_APE_College Ave Water Main.mxd Date: 3/10/2020 2:04:54 PM User: prbaskins

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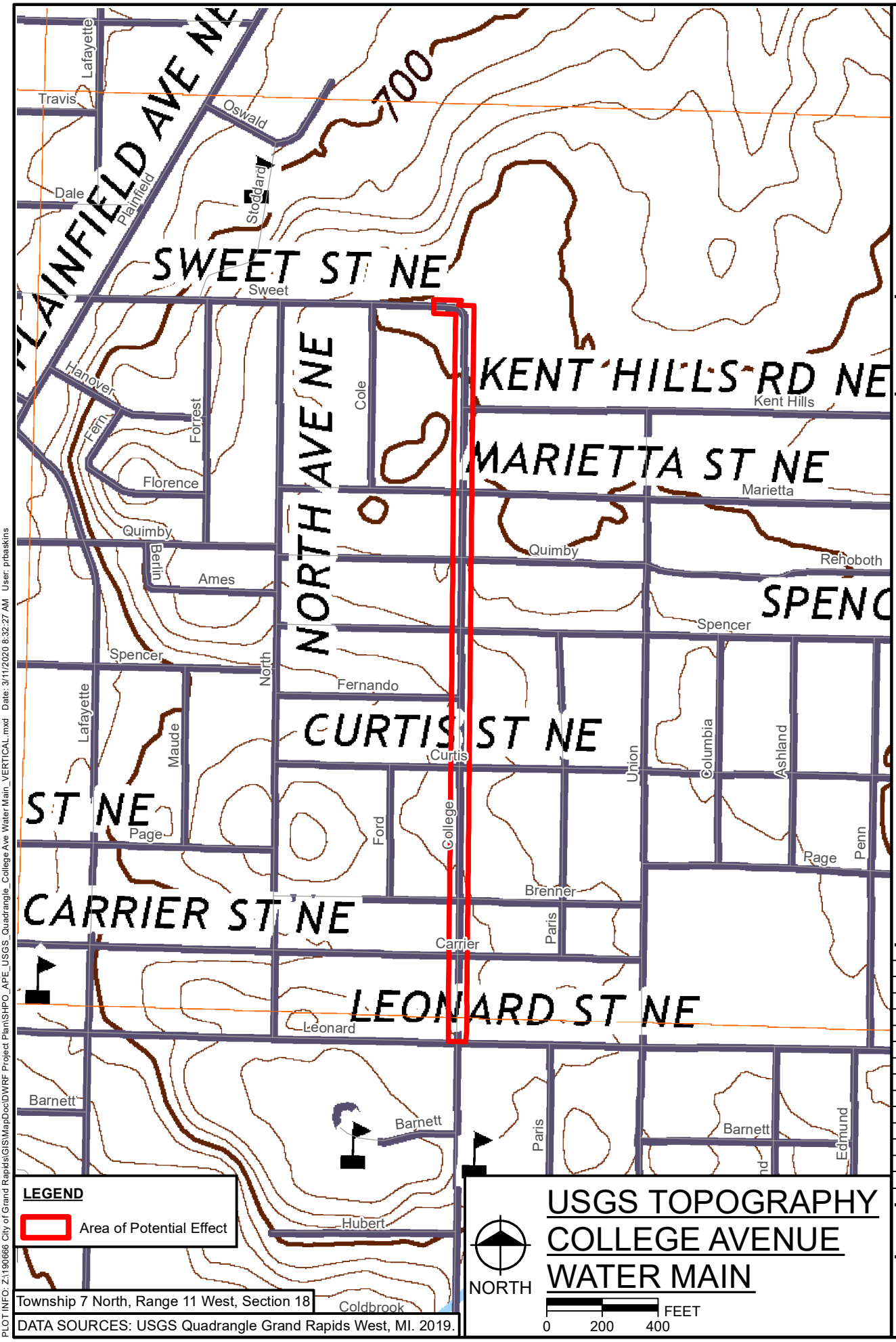

LEGEND

Area of Potential Effect

NORTH

USGS TOPOGRAPHY
COLLEGE AVENUE WATER MAIN

0 200 400 FEET

Township 7 North, Range 11 West, Section 18

DATA SOURCES: USGS Quadrangle Grand Rapids West, MI. 2019.

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PROJECT NO.
190666

FIGURE NO.
2.2

PLOT INFO: Z:\190666 City of Grand Rapids\GIS\MapDoc\DWRF Project Plan\SHPO_APE_USGS_Quadrangle_College Ave Water Main_VERTICAL.mxd Date: 3/11/2020 8:32:27 AM User: prbaskins

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PLOT INFO: Z:\190666 City of Grand Rapids\GIS\MapDoc\DWRF Project Plan\SHPO_APE_Straight SW and Wealthy SW Water Main.mxd Date: 3/10/2020 2:33:32 PM User: prbaskins

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City of Grand Rapids
Kent County, Michigan

DWRF Agency Review

PROJECT NO.
190666

FIGURE NO.
3.1

PLOT INFO: Z:\190666 City of Grand Rapids\GIS\MapDoc\DWRF Project Plan\SHPO_APE_USGS_Quadrangle_Straight SW and Wealthy SW Water Main.mxd Date: 3/10/2020 3:48:55 PM User: prbaskins

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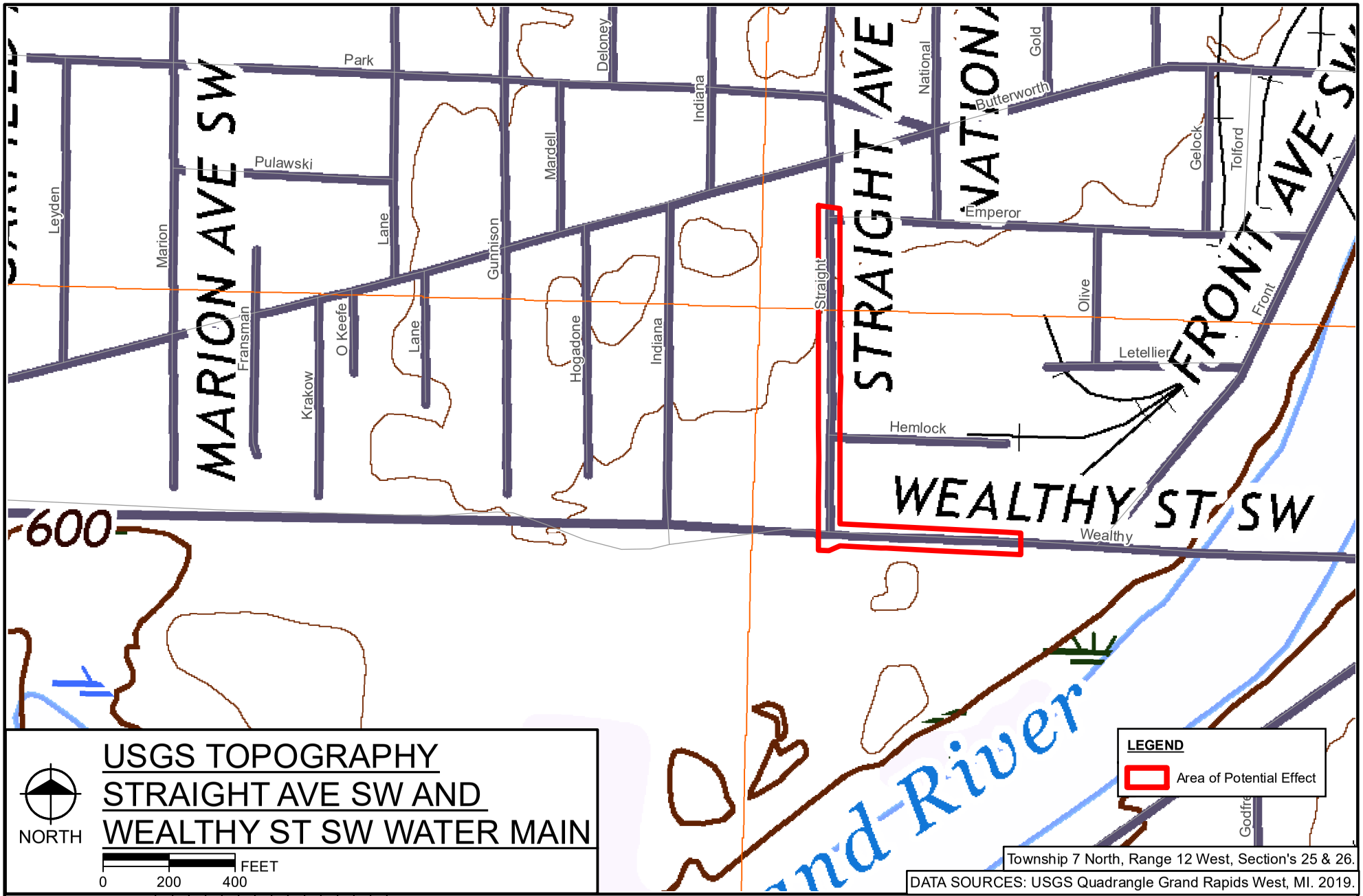

USGS TOPOGRAPHY
STRAIGHT AVE SW AND WEALTHY ST SW WATER MAIN

Township 7 North, Range 12 West, Section's 25 & 26.

DATA SOURCES: USGS Quadrangle Grand Rapids West, MI. 2019.

FIGURE NO. 3.2

PROJECT NO. 190666

City of Grand Rapids
Kent County, Michigan

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PLOT INFO: Z:\190666 City of Grand Rapids\GIS\MapDoc\DWRF Project Plan\SHPO_APE_Page, Carrier, Lister, and Plainfield Improvements.mxd Date: 3/11/2020 4:19:13 PM User: prbaskins

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PROJECT NO.
190666

FIGURE NO.
4.1

PLOT INFO: Z:\190666 City of Grand Rapids\GIS\MapDoc\DWRF Project Plan\SHPO_APE_USGS_Quadrangle_Page, Carrier, Lister, and Plainfield Improvements.mxd Date: 3/10/2020 3:55:24 PM User: prbaskins

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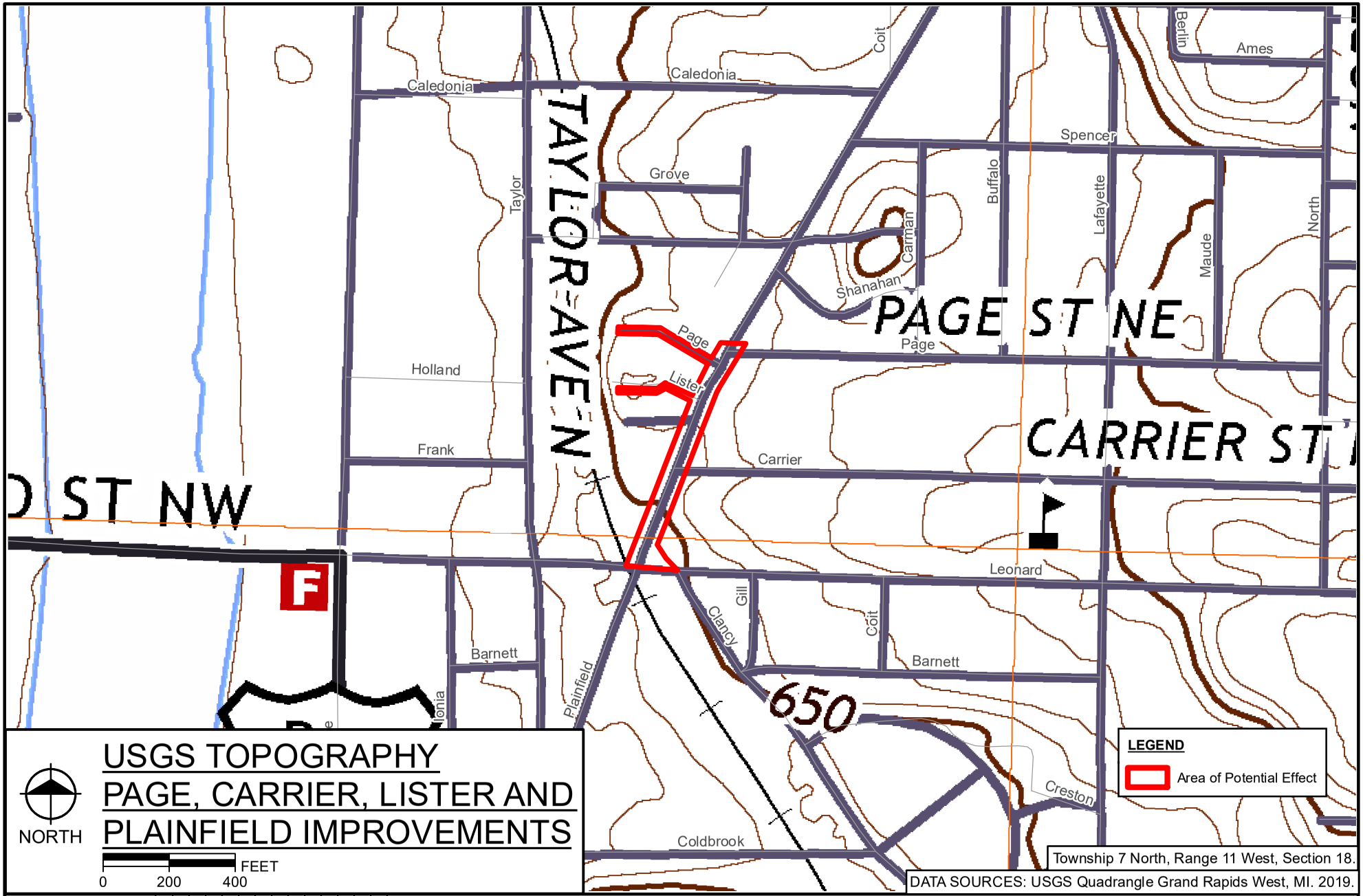

NORTH

USGS TOPOGRAPHY
PAGE, CARRIER, LISTER AND PLAINFIELD IMPROVEMENTS

FEET
0 200 400

Township 7 North, Range 11 West, Section 18.

DATA SOURCES: USGS Quadrangle Grand Rapids West, MI. 2019.

FIGURE NO. 4.2

PROJECT NO. 190666

City of Grand Rapids
Kent County, Michigan

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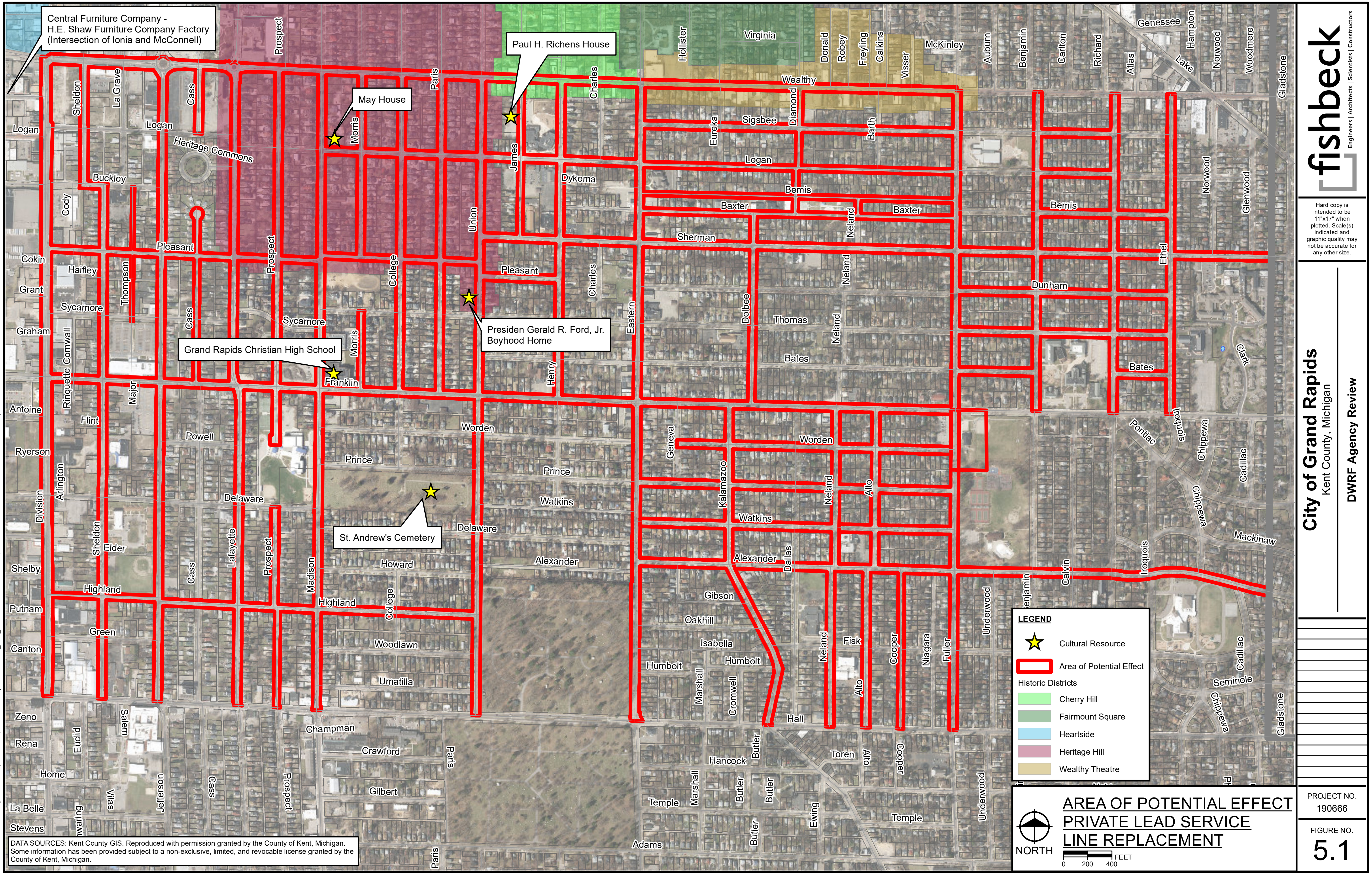

PLOT INFO: Z:\190666 City of Grand Rapids\GIS\MapDoc\DWRF Project Plan\SHPO_APE_Private Lead Service Line Replacement.mxd Date: 3/11/2020 4:03:47 PM User: prbaskins

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PLOT INFO: Z:\190666 City of Grand Rapids\GIS\MapDoc\DWRF Project Plan\SHPO_APE_USGS_Quadrangle_Private Lead Service Line Replacement.mxd Date: 3/11/2020 3:42:57 PM User: prbaskins

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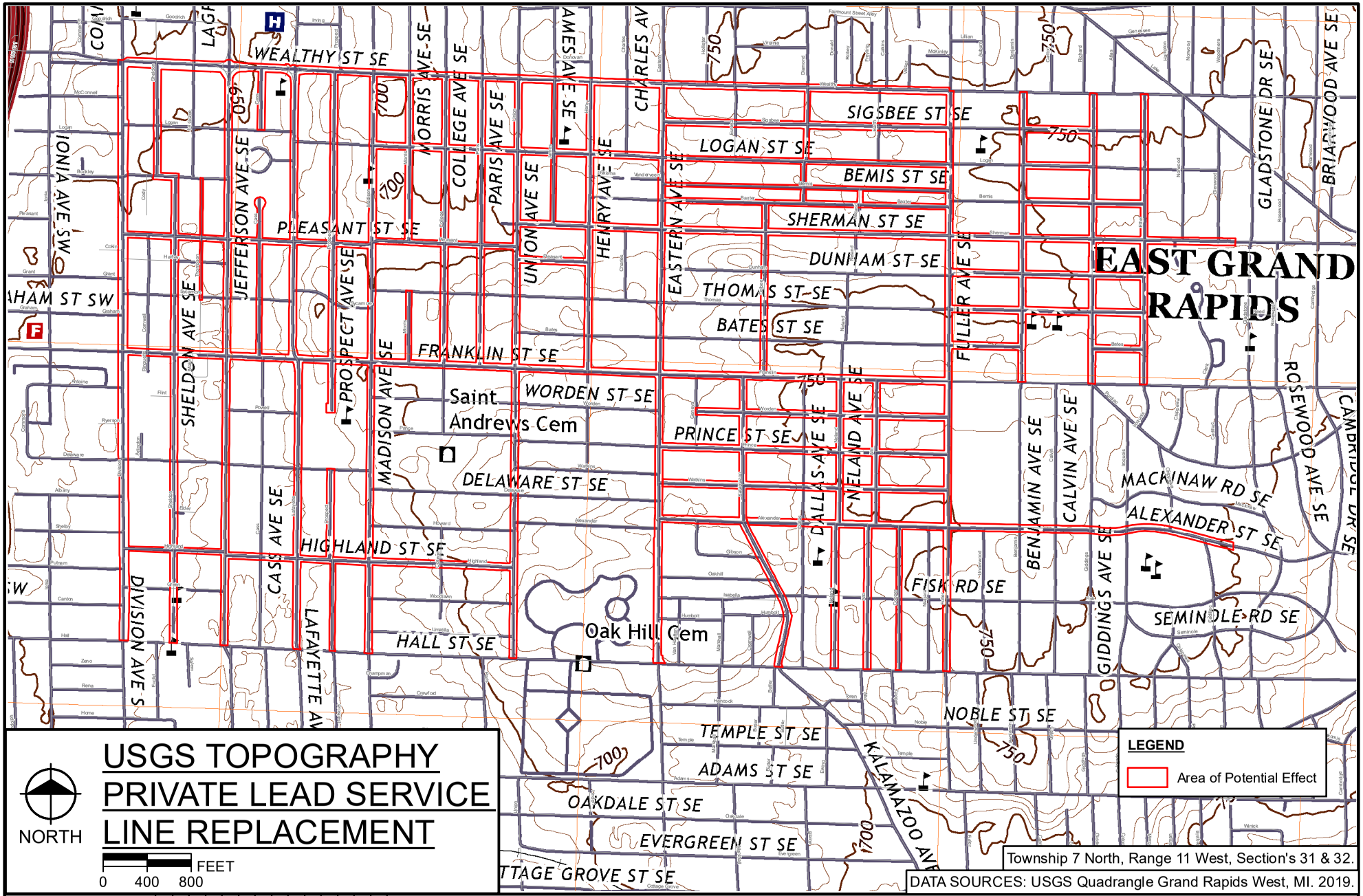

USGS TOPOGRAPHY
PRIVATE LEAD SERVICE LINE REPLACEMENT

NORTH

FEET
0 400 800

LEGEND

Area of Potential Effect

Township 7 North, Range 11 West, Section's 31 & 32.

DATA SOURCES: USGS Quadrangle Grand Rapids West, MI. 2019.

FIGURE NO. 5.2

PROJECT NO. 190666

City of Grand Rapids

Kent County, Michigan

DWRF Agency Review

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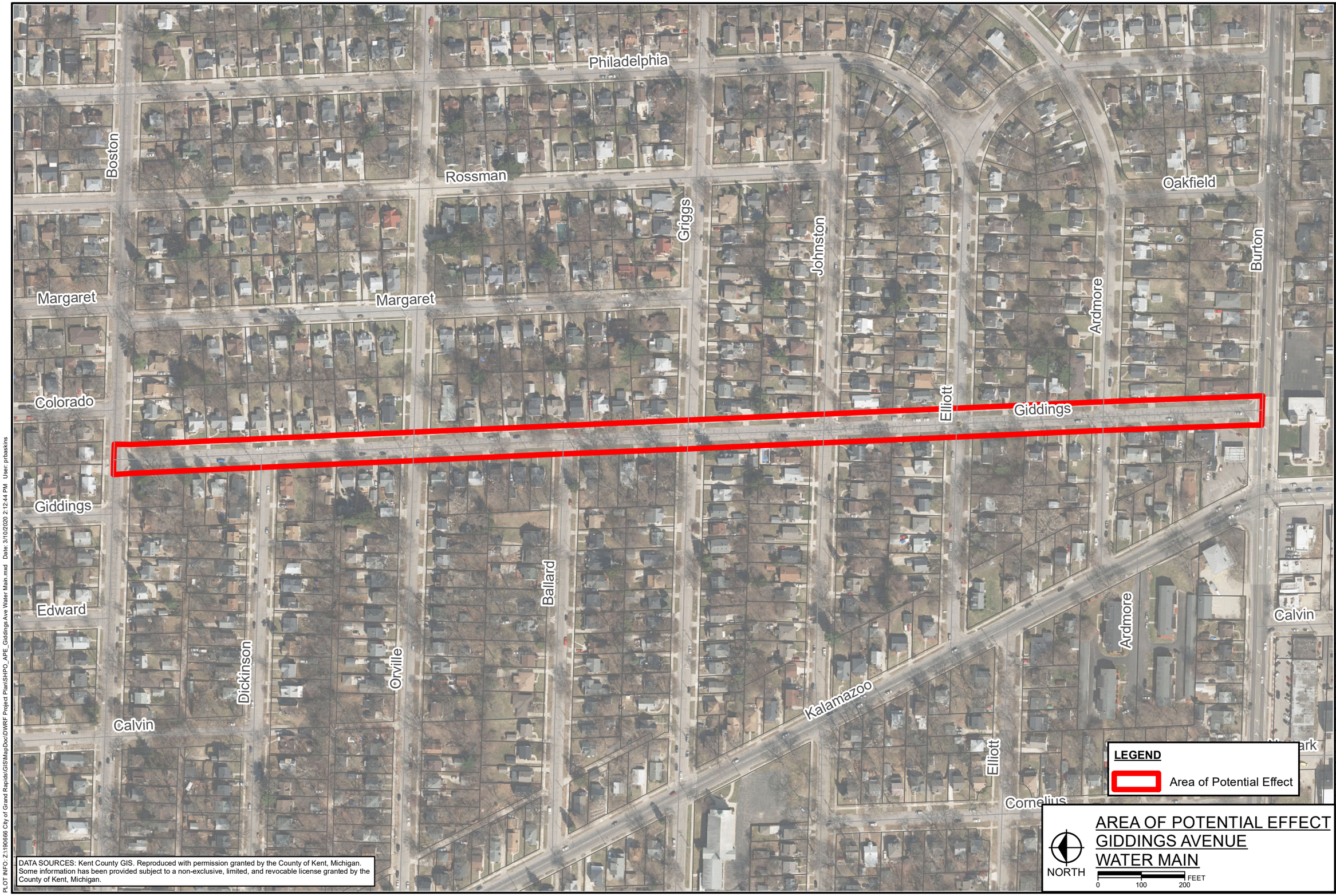

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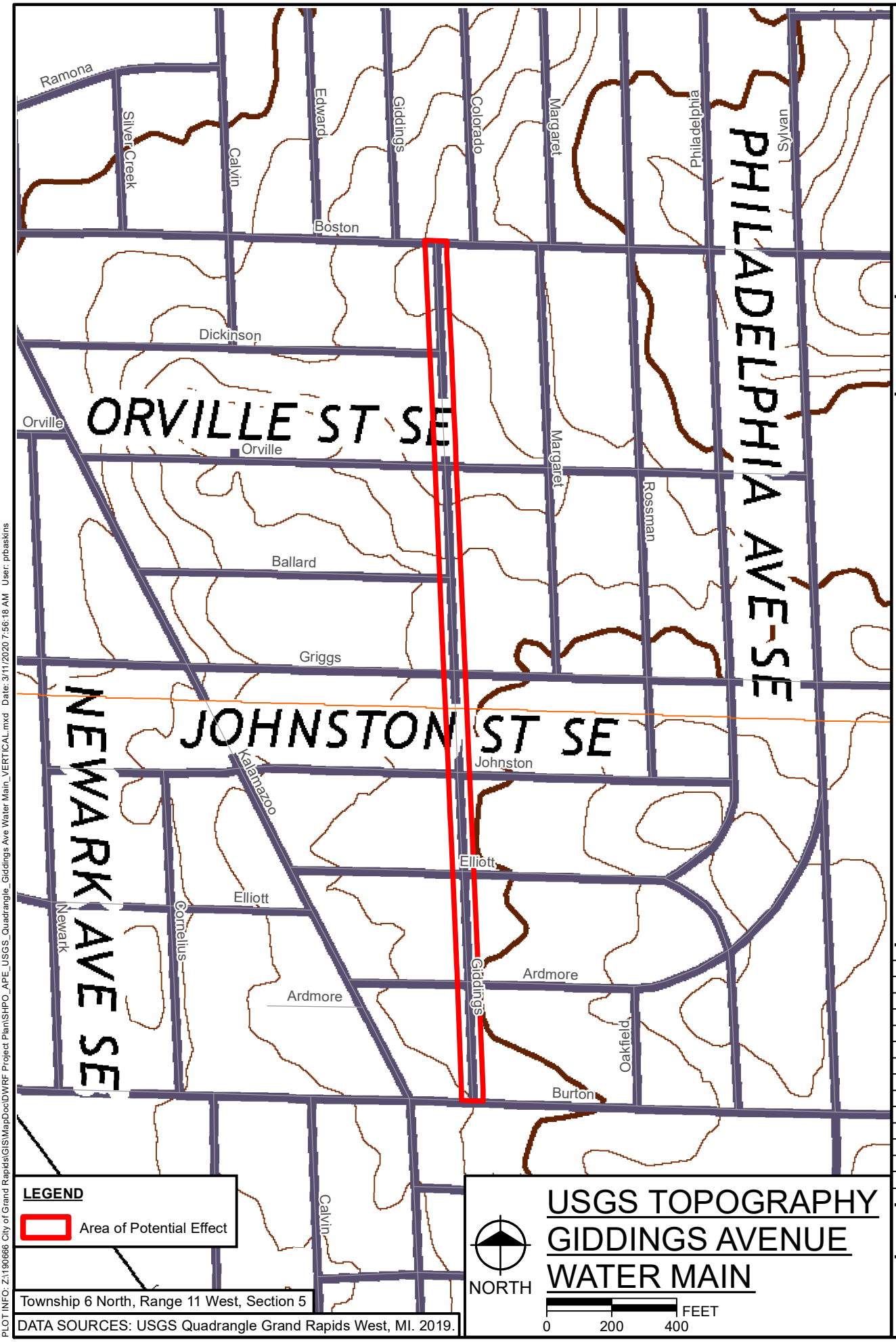
City of Grand Rapids
Kent County, Michigan

DWRF Agency Review

AREA OF POTENTIAL EFFECT
GIDDINGS AVENUE WATER MAIN

PROJECT NO.
190666

FIGURE NO.
6.1



LEGEND

Area of Potential Effect

Township 6 North, Range 11 West, Section 5

DATA SOURCES: USGS Quadrangle Grand Rapids West, MI. 2019.

NORTH

USGS TOPOGRAPHY
GIDDINGS AVENUE WATER MAIN

0 200 400 FEET

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DWRF Agency Review

PROJECT NO.
190666

FIGURE NO.
6.2

PLOT INFO: Z:\190666 City of Grand Rapids\GIS\MapDoc\DWRF Project Plan\SHPO_APE_USGS_Quadrangle_Giddings Ave Water Main_VERTICAL.mxd Date: 3/11/2020 7:56:18 AM User: prbaskins

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AREA OF POTENTIAL EFFECT
ELEANOR STREET
WATER MAIN

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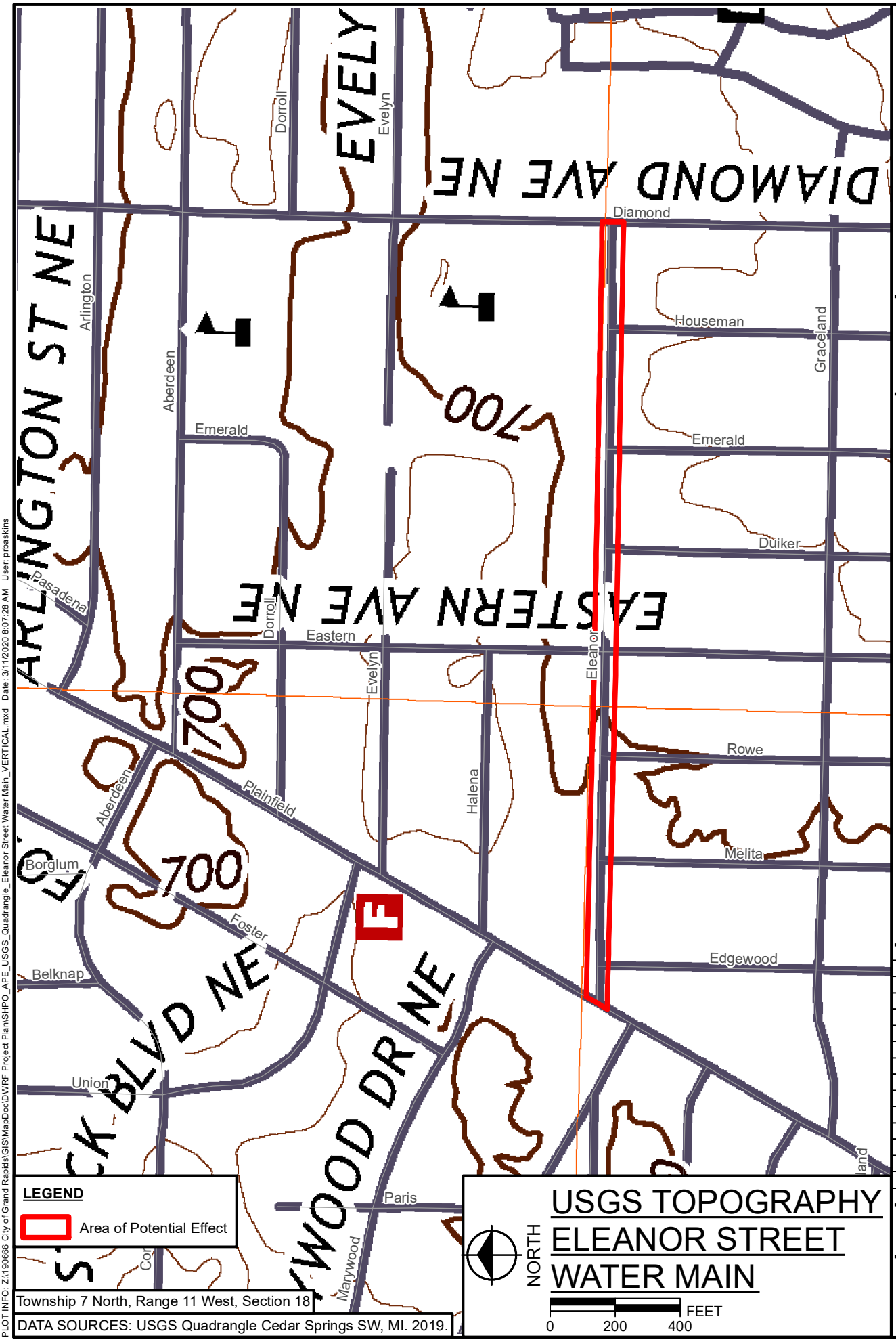
City of Grand Rapids
Kent County, Michigan

DWRF Agency Review

PROJECT NO.
190666

FIGURE NO.
7.1



LEGEND

Area of Potential Effect

Township 7 North, Range 11 West, Section 18

DATA SOURCES: USGS Quadrangle Cedar Springs SW, MI. 2019.

NORTH

USGS TOPOGRAPHY
ELEANOR STREET WATER MAIN

FEET

0 200 400

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Kent County, Michigan

DWRF Agency Review

PROJECT NO.
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FIGURE NO.
7.2

PLOT INFO: Z:\190666 City of Grand Rapids\GIS\MapDoc\DWRF Project Plan\SHPO_APE_USGS_Quadrangle_Eleanor Street Water Main_VERTICAL.mxd Date: 3/11/2020 8:07:28 AM User: prbaskins

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LEGEND

- Area of Potential Effect
- Cultural Resource

NORTH

0 100 200 FEET

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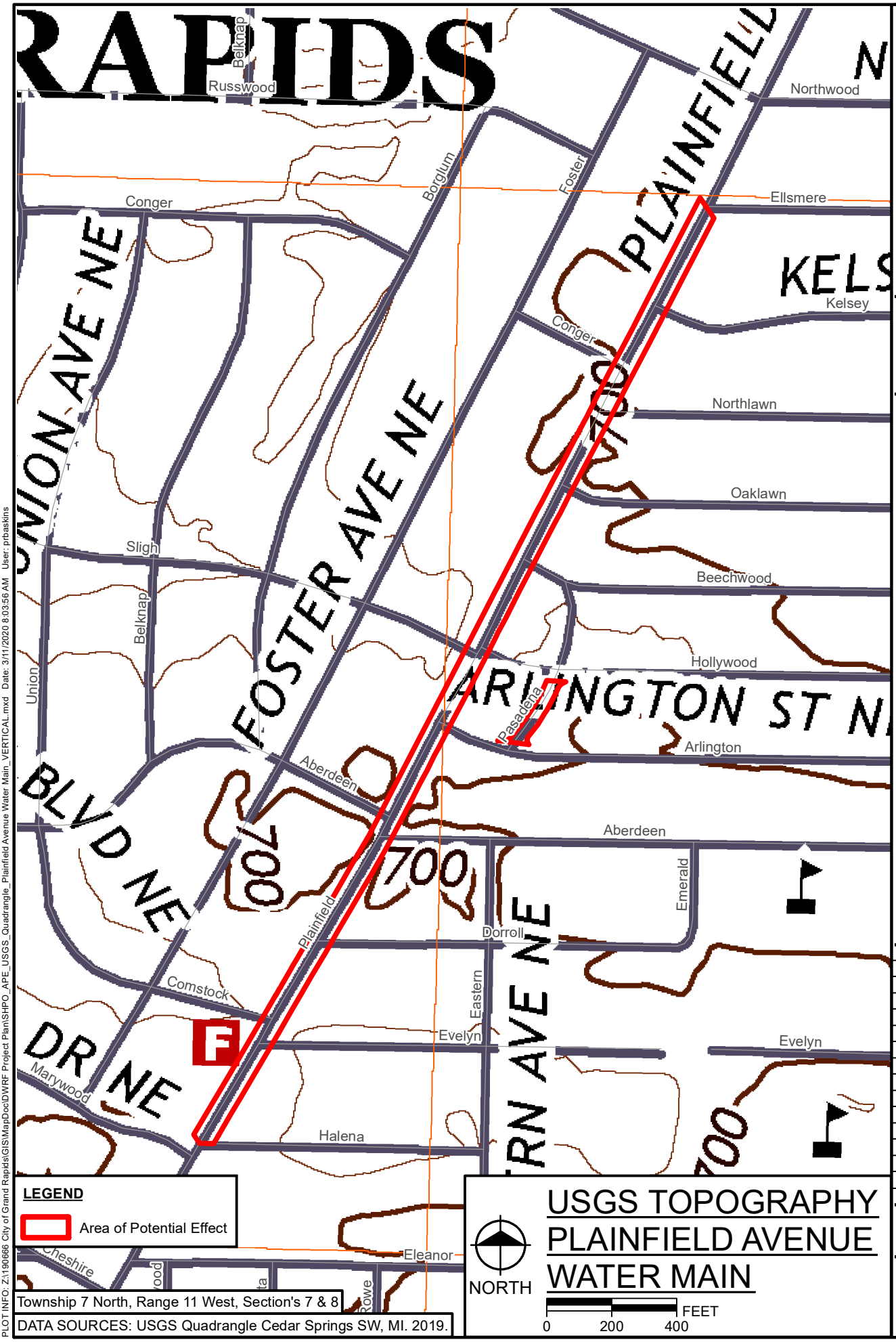
City of Grand Rapids
Kent County, Michigan

DWRF Agency Review

AREA OF POTENTIAL EFFECT PLAINFIELD AVENUE WATER MAIN

PROJECT NO.
190666

FIGURE NO.
8.1



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City of Grand Rapids
Kent County, Michigan

DWRF Agency Review

PROJECT NO.
190666

FIGURE NO.
8.2

PLOT INFO: Z:\190666 City of Grand Rapids\GIS\MapDoc\DWRF Project Plan\SHPO_APE_USGS_Quadrangle_Plainfield Avenue Water Main_VERTICAL.mxd Date: 3/11/2020 8:03:56 AM User: prbaskins

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PLOT INFO: Z:\190666 City of Grand Rapids\GIS\MapDoc\DWRF Project Plan\SHPO_APE_Garfield Avenue Water Main.mxd Date: 3/10/2020 2:11:40 PM User: prbaskins

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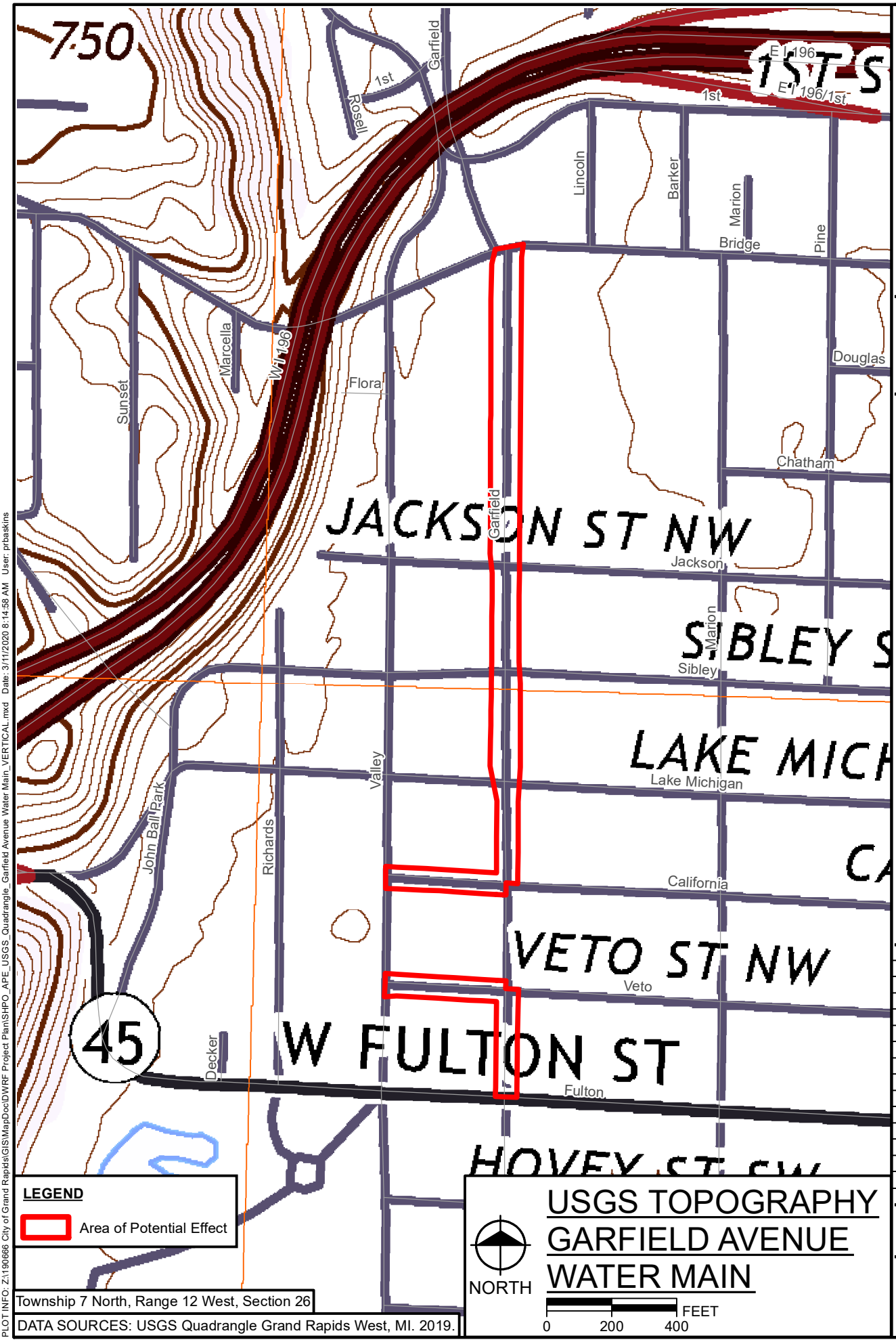
City of Grand Rapids
Kent County, Michigan

DWRF Agency Review

PROJECT NO.
190666

FIGURE NO.
9.1



LEGEND

Area of Potential Effect

NORTH

USGS TOPOGRAPHY
GARFIELD AVENUE WATER MAIN

0 200 400 FEET

Township 7 North, Range 12 West, Section 26

DATA SOURCES: USGS Quadrangle Grand Rapids West, MI. 2019.

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Kent County, Michigan

DWRF Agency Review

PROJECT NO.
190666

FIGURE NO.
9.2

PLOT INFO: Z:\190666 City of Grand Rapids\GIS\MapDoc\DWRF Project Plan\SHPO_APE_USGS_Quadrangle_Garfield Avenue Water Main_VERTICAL.mxd Date: 3/11/2020 8:14:58 AM User: prbaskins

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Appendix 6

Appendix 7